COMPUTER WEEKLY

Printer manufacturers interested in lasers

OPTICAL storage systems offering 1,000 to 1,500 times the capacity of today's disc systems at one-tenth to one-hundredth the cost should begin to appear next year, thanks to the gallium arsenide GaAs semiconductor laser. This is according to Michael Coden, of Optical Information Systems, an Exxon company.

"When we started to manufacture GaAs lasers, we thought the main area of application would be communications, but we are finding a high level of interest from computer peripheral companies for both printing and storage applications," he told Computer Weekly.

"There are at least 12 companies engaged in research and development on non-impact printing systems using lasers.

"The advantages in terms of flexibility and multiple character sets make laser printing attractive even at speeds down to 2,000 to 3,000 lpm, and they are bound to be less expensive than impact printers in the long run."

Other Exxon companies are interested in the lasers for communications, word processing printer and storage applications, and the parent is studying their use in measurement and process control for oil drilling and refining.

Optical Information Systems is also researching the application of compound semiconductors to high-speed switching.

"We can made field effect transistors in GaAs which switch at between 6 and 10 picoseconds," said Coden.

"Compound transistors switch two or three times faster than silicon. They are larger, more expensive and consume more power, but would be attractive for critical frequently-used processor logic circuits. We should have products on the market within two years, and I believe we are at the same stage of development with compound circuits as silicon was in 1955."

NEWS IN BRIEF

GA back with 32-bit micros

AN ambitious plan to re-enter the microelectronics market with a 32-bit microprocessor is understood to be under way at US minimaker General Automation. The plan is to develop the micro, with the necessary ancillary circuits, at a new LSI plant in Scottsdale, Arizona, to offer it as a product as well as incorporating it into its own computer systems.

The chip set for the GA 110 and 220 is manufactured by Synertek.

Basic for OEMs

INTEL'S ANSI/ECMA standard Basic-80 software package is now available in an OEM version, for running on the company's range of single-board computer systems. Known as ISBC 802 Basic-80, it is available in two forms, one relocatable, allowing tailoring to meet system requirements, and one "predefined" for specific members of the SBC family.

Now in UK

THE multi-user, cross compiler universal microprocessor development system from Boston Systems Office of Waltham, Massachusetts (CW August 24, 1978), is now being sold in the UK and Benelux countries by Software Sciences. The system can handle up to 20 online users, and can be used with any commercially available microprocessor.

Microfilm terminals

KODAK has introduced two microprocessor controlled microfilm/retrieval terminals, the IMT-100 reader and the IMT-150 reader/printer. Each can operate either in standalone mode or in online mode.

Stock Exchange chooses US mini for new market information system

REGARDING the development of viewdata software as a "trivial task", the Stock Exchange Special Systems Group is developing a new market information system for brokers and has already ruled out the GEC 4080 in favour of one of three US minis.

Called Topic, Teletext Output of Price Information by Computer, the system is planned as a replacement for the Ferranti Argus 400-based Market Price Display System early next year.

MPDS started in 1970 and its 22 pages are now providing inadequate for all the information used by brokers on stock market trading.

For example, there is no room for information on the London Traded Options Market which started last year. This deals in options to buy stocks and shares and is modelled on the well-established Chicago options market.

Development of Topic started in December, when the Stock Exchange Council gave formal approval. An existing DEC PDP-11/70 is used to emulate the Topic CPU working with one teletext TV set converted in-house to work to Prestel viewdata standards.

Viewdata was chosen because cheap terminals were available from several manufacturers, and because information can be produced to a standard which is already being used by financial information services.

This week GEC Private Viewdata Systems is supplying two prototype Modular Office Systems which use up to four keypads and four colour or black and white screens with each link to the database. GEC hopes that these will be chosen as standard for the service since an initial 2,000 will be needed just to replace the MPDS terminals.

Topic will be actively marketed whereas MPDS only grew in response to demand.

The final decision on the CPU will also be taken this week, choosing between DEC VAX-11/780, Modcomp Classic 7870 and Tandem 16 minicomputers.

Software production is expected to occupy two or three people for a year.

The network itself will use voice band telephone lines, rather than the wideband circuits provided by the Post Office to carry the video signals used in MPDS. And the Special Systems Group is designing its own multiplexers and network control circuitry using a Zilog development system, which may mean that Z80 microprocessors will be used in the network hardware.

Modems from several manufacturers are to be evaluated for the network links, short-haul modems to sites in London and normal for other UK and foreign sites.

EEC party off to India this week

EIGHT European hardware companies, led by ICL, Siemens and Olivetti, and 12 software companies, among them Fraser-Williams of the UK and Steria of France, will be represented on the second EEC computer delegation to India, which departs on Saturday (CWI, February 15).

The delegation is going at the request of the Indian government, which is interested in fostering local manufacture of small computers and peripherals for both export and local use, and now requires a local manufacturing added value of 30% minimum.

Several other lines of collaboration will also be pursued. They include the establishment of joint ventures in India to service the rest of the Asian market; the commissioning of Indian companies to write systems software for European manufacturers; and the marketing in other Third World countries of socio-economic applications developed in India.

Two software houses order 4331s

TWO of the UK's leading software houses, MSP and Altergo, have ordered their first in-house mainframes following the launch of IBM's low-cost 4300 series. Each company has placed a "first-day" order for two 4331 processors, and both will have one machine in London, with the other in the US.

Altergo's machines will be used primarily for DOS development work, with a limited amount of OS/VS1 time also available. It will continue to use bureau services for MVS development and for testing the full range of device support.

MSP will also use its 4331s primarily for development, but plans in addition to implement a comprehensive office administration system. This will link its offices worldwide into a single data network, probably via Telenet.

Based on the Datamanager data dictionary, this system will handle data ranging from worldwide sales figures to electronic mail and calls for some 10 terminals in the London office alone.

The software may subsequently be sold by MSP as a package for the electronic office.

Both companies hope to take delivery from IBM before the end of year, but Altergo indicated that it would seriously consider a plug-compatible alternative, almost certainly a Magnusson, should it not be awarded an early delivery date in the ballot.

CDC adds to Omega line

A NEW model in the Omega 480 line of IBM plug-compatible processors has been introduced in the US by Control Data, and the company has cut prices on the two existing models.

Made for Control Data by IPL Systems, the Omegas are targeted against the middle of the 370 line, competing with the 138 and 148. The new model, a 3031-class machine, is priced at from $360,000 for a two Megabyte system to $840,000 for eight Megabytes, implying not more than $30,000 per Megabyte of main memory, compared with about $70,000 from IBM on the 3030 series.

Price cuts on the existing Omegas range from 35% on a half Megabyte Model I to 47% on a four Megabyte Model II, again reflecting the tumbling cost of memory.

Scicon wins Euronet contract

IMPLEMENTATION of the standard Euronet command language at three pilot sites in Europe is to be monitored by Scicon under a new contract from the EEC.

Scicon's work will be directed at co-ordinating the three implementations and producing a generalised user manual. It may also be involved in revising, in the light of experience, the existing published guidelines Standard Commands for Retrieval Systems.

The three Euronet host installations primarily involved are DIMDI, the German Medical Information Centre in Cologne, ESA's Information Retrieval Service, in Frascati, Italy, and the Pisa-based Italian University CNUCE.

Scicon will also be providing advice at sites in Berlin, Milan and Paris, where hardware in use includes Siemens, Univac and CII computer systems.

Heading the project will be Alun Negus, who previously had primary responsibility for definition of the command language while working at SPEC. He has recently joined Scicon.

Appeal for Soviet scientist

●From front page

scientific community in the country of his choice," in this case, Israel. After some initial objections, one of the Soviet delegates agreed to accept the letter.

Last year, Prof Donald Michie, supported by Computer Weekly, organised an appeal to Soviet leader Leonid Brezhnev on behalf of Anatoly Scharansky (CW, July 13, 1978). He was one of the active members of the Helsinki Agreement monitoring group and has now been imprisoned on a treason charge.

RCA turns key

TURNKEY systems based on Computer Automation minicomputers are now being offered by RCA Systems Services of Guisborough, Cleveland, a firm which already provides software support and hardware field maintenance for CA based systems.

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Briefing

Grant for office jobless study

EQUAL Opportunities Commission has made a grant of £6,000 to two researchers from Communications Studies and Planning to find out how many women will be put out of work by new technology in offices. The two are looking at past case studies and interviewing managers and workers in firms using word processing. Their report should be available by the end of August.

They intend to forecast how widely spread the new technology will become in a few years' time, and what the effects will be on job opportunities for women, and job satisfaction.

50,000 orders

IBM has taken 50,000 orders worldwide for its 4300 series, according to the president of Adapso, John Imlay, speaking in London last week. "First-day order" customers in the UK, independently estimated at about 500, will be notified of delivery dates early in June, an IBM spokesman said this week, following "order randomisation" in April and May.

$32m takeover

MOVING into microelectronics, IBM-compatible disc and tape drive manufacturer Storage Technology Corp of Louisville, Colorado, is to acquire Microtechnology Corp of Sunnyvale, California. The price set is about $32 million in Storage Technology shares. Microtechnology Corp is primarily involved in the design of integrated circuits.

Bank trial

BARCLAYS Bank is to evaluate two competitive high-speed non-impact printers running alongside each other. One is the IBM 3800 and the other the Honeywell Page Printing System. Barclays is to rent a 12,000 lpm PRS for a 12-month trial period starting in June.

Micro phones tests

THE Post Office plans to start field trials later this year of microprocessor-controlled public telephones. These will probably be operated by a debit card which the caller inserts into the phone in place of coins. The pre-purchased card carries a number of units of call credit, and these are erased as they are used up. The remaining credit is shown on a display on the phone.

Viewdata boom

ORDERS for viewdata and teletext chip sets and modules made by GEC Semiconductors in Wembley have reached £500,000, from set makers including STC, Bell Northern of Canada, Cinerry Leisure and two GEC companies. This figure is expected to double in the next two months. The viewdata set of seven chips now sells for £130 in quantities of 1,000, but this price is expected to reduce to £80 by the end of the year by which time a minimum 15,000 should have been sold.

WILLIAMS . . . . Grasp opportunities offered by the micro, or be left behind.

Massive ignorance of micros in UK firms

—SAYS REPORT TO DEPARTMENT OF INDUSTRY

FAILURE of British industry to understand the potential of the microprocessor has been further emphasised by a survey carried out by PA International for the Department of Industry. This shows a massive ignorance of micro technology and indicates that of the companies interviewed, only 8% had taken any action in this area, and most of these were in the electronics industry. Of the rest, 38% were beginning to look at the subject, but 53% had done nothing at all.

Full details of the survey have not been released, but points from it were given by Industry Minister of State Alan Williams when he reviewed the progress of the Microprocessor Application Project which was launched last June (CW, June 1, 1978), and introduced a programme to promote awareness of the micro.

The four elements of this scheme include workshops to acquaint top decision-makers with the micro and its potential; co-operation with the TUC's plan for shop floor awareness; joint CBI/TUC study tours overseas; and the setting up of a MPA information centre.

If we did not grasp the opportunities offered by the micro we would be left behind by the rest of the world, said the Minister; we would be able to offer down market products only.

British industry, he said, had buried its head in the sand, a situation highlighted by the reaction of British visitors to Japan. Representatives of two companies sent to investigate developments there had been "staggered by what they saw," and shop stewards from a Thorn Electrical plant returned convinced of the importance of exploiting the micro.

The new awareness programme is designed to inform at all levels of industry and is based on 28 training centres throughout the country. Consideration is also being given to using the Post Office Prestel service and of developing courses in conjunction with the Open University. It is expected that about 6,000 training places will be available during the next year.

Dealing with the progress of

● Turn to page 23

CIVIL SERVANTS DISRUPT BETS TAX

Bonanza for bookies as strike spreads

LAUNCHING a second wave attack on the government, members of the Civil and Public Servants Association and the Society of Civil and Public Servants have hit out at yet more computer centres, in their bid to gain full pay comparability with the private sector (CW, March 15).

In Manchester, the Customs and Excise computer centre has been affected by a walk-out of 31 staff, disrupting the collection of betting tax for England and Wales, estimated to be about £1 million a week.

Racecourse "bookies" could benefit from this as they may not have to pay tax on "on course" bookmaking.

Dealing with the payments to research councils and educational establishments, the Department of Education and Science office at Darlington can no longer use its computer system, while the Department of Trade office in Cardiff, which handles payments to nationalised industries and issues regional development grants estimated at £50 million a week is in a similar predicament.

The provision of export cover from the Export Credits Guarantee Department in Manchester and Cardiff is likely to be severely curtailed by strike action, while repayments on Save-As-You-Earn and National Savings Certificates processed by the computer at the Department of National Savings, Durham have been halted.

'Unions must change' with advent of micros

MODIFIED trade unions will be a feature much needed in the future as part of our industrial strategies for dealing with "temporary employee dislocation" and the later emergence of altered or totally new job functions, caused by the incorporation of microelectronics into industry.

This is the view of Jerry Wasserman, in a report by international consultants Arthur D. Little which attempts to predict the Strategic Impact of Intelligent Electronics in the US and Western Europe, 1977-1987.

Wasserman also predicts that the microelectronics revolution is likely to create more than a million extra jobs in Western Europe during the next decade, due to the fast growth of newer sectors of industry.

Wasserman cites industrial relations, particularly the proliferation of UK trade union organisations, as a possible barrier to the realisation of some of the report's predictions. There are too many trade unions, each seeking a different goal, he says, and therefore they must change.

● Turn to page 23

IBM look-alike cuts VM system overhead to 3%

A MICROCODED VM assist which cuts the overhead imposed by the IBM operating system from a typical 40% to as little as 3%, is just one of a package of radical innovations on the way from Magnuson Systems.

With memory faster than that offered by IBM at a matching $15,000 per Megabyte, and plans to down-load microcode over telephone lines, the Santa Clara-based company looks likely to confound analysts' predictions that IBM's recent offerings will wipe it out.

VM/370 is the IBM operating system under which several other IBM operating systems can be run simultaneously in their own "virtual machines". Since the announcement of the 4300 series, it has become one of the three key IBM operating systems, the others being MVS and DOS/VSE (CW, February 15).

However, because it is a skeleton operating system in its own right, it duplicates many of the functions of the "guest" operating systems run under it and therefore often imposes unacceptable overheads if used to run production work (CW, July 6, 1978).

IBM says that all the microcode offered with the 4300s cuts the VM overhead by 80%.

Amdahl has developed a software "hypervisor" for MVS running under VM. Called VM Performance Enhancement, it reduces the VM overhead on one MVS virtual machine from as much as 40% to under 10%, enabling the production workload to be run in the "efficient" MVS virtual machine while a new release of the operating system is being tested in another (CW, July 20, 1978). However, it is understood that Magnuson's microcode allows a DOS/VS, an OS/VS 1 and two MVS virtual machines to run concurrently with only a 3% overhead.

Magnuson is also working on the idea of down-loading microcode to user sites over telephone lines.

Because of the "strategic

● Turn to page 9

BOC sells Level 66 base

BOC DATASOLVE has sold its base of Honeywell Level 66 time sharing customers to System-share of Edinburgh, and is closing down the Birmingham centre that ran the service. The leased Honeywell 66/07 there has been returned to manufacturer.

BOC Datasolve says that it will open a new sales and support office in Birmingham but that all its services will now be based on its IBM and ICL machines in London and at Sunbury-on-Thames.

COMPUTER WEEKLY'S INSIDE NEWS

OEM THRIVES

OEM is the term applied to firms that mass produce computer hardware and also, rather confusingly, to the systems houses that they supply in volume. However, this confusion has not stopped the OEM business from thriving or CW from devoting a special feature to the subject. Pages 17/19.

PRIVATE OPINIONS

THE unconventional views on privacy expressed in CW and on television by Rory Johnston have provoked some lively response in our Letters columns. Page 14.

UNION VIEW

THE first full-scale study of word processing by a union is out this week. Clerical union Apex endorses WP as a welcome aid to productivity and a potential growth area for UK industry. Pages 2 and 5.

HIGH PERFORMANCE

IBM's T&O is notoriously large and inefficient. Considerable interest is therefore being shown in a compact high-performance T&O replacement originally developed by a Swedish university and now to be marketed worldwide by Alfango. Page 7.

ALSO . . .

JOB OPPORTUNITIES: PAGES 25-83 MIDLANDS JOBS: PAGES 49-51

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Catch-22 for the employer

THE white-collar union Apex has a good reputation among *word processing people as an* enlightened, forward looking crowd, informed "believers" in the new technology. The union's working party on word processing has produced a report on the trade union response to office technology that is technically authoritative and well-researched (see page 5). Unfortunately, when it reaches the stage of formulating a policy, Apex appears, Janus-like, to be trying to look in two directions at once.

The union firmly declares itself in favour of increased productivity. But it also has just as firm a policy that there shall be no loss of jobs through new technology.

It even asserts that if an organisation's workload is expanding and the number of jobs would rise in the absence of word processors, then even with new equipment there must be more jobs created as well.

Finally, Apex suggests that if, as a last resort, staff have to be laid off, their firm should keep on paying them until they find a new job.

In particular, reduction in jobs through natural wastage should not be allowed, says Apex, because it causes unemployment among school-leavers.

An employer could be forgiven if he felt he was being presented here with a Catch-22. "You must continue to take on more people and you will never be able to get rid of them," it seems he is being told.

There is little encouragement here for going into business at all.

What the unions must recognise is the fundamental nature of technical progress. It consists of improving the productivity of groups of people so that fewer are required to provide the same service to the community. The people thus displaced then do something else which is more useful, and we are all better off. If they do not, then the community's resources are being wasted and we are worse off.

An essential part of this is that people have to change their jobs, sometimes even the industry they work in. Individuals may not like this, but such change is necessary if we are to have any progress at all.

We certainly cannot impose rigid manning levels on separate organisations, as if the sole purpose of each were to provide jobs. Clearly, as markets and technical developments interplay, staffing needs of different sectors will fluctuate, but if the overall economy continues to grow, new opportunities will appear faster than others disappear.

Apex claims that the effect of microprocessors on offices will be greater than in any other sector of employment. This is a highly dubious assumption. While a completely automated factory can be envisaged, a large proportion of those who work in offices are there to do creative thought, and are in no way threatened by micros.

Even among those with routine office jobs, the threat of unemployment seems hard to credit. There are 26,000 vacancies for typists in London, and the situation is similar in other cities. For those living in other areas, communicating word processors offer the opportunity of "importing" typing work from the cities (CW, November 9 1978).

We must make sure that growth is not held back by excess caution.

Apex is also very worried about job content — that typists switched to word processors can be deskilled. This is ironic, in that many employers are tempted by word processing simply because it is so hard to find typists with the skills needed to do a good job on conventional equipment. There is much talk in the report about "participation in system design," affirming that without it systems will be inhuman, inefficient, difficult to use, and generally unattractive to the workforce.

One must remember, though, that the interests of workers and management are the same here. Good design leads to the most output, and a discontented workforce will work somehere else.

There is no reason to believe that unions would be better at doing management's job than managers.

Up to now, unionisation of office workers has been mainly confined to the public sector. If Apex succeeds in imposing its will on the public sector, while private firms introduce word *processing with no such restrictions*, the imbalance resulting may have widespread effects.

We await developments with interest.

FOCUS

Software value for money

COMPUTING is generally held to be an exact science, with equipment, systems and personnel noted for logical working and positive actions. Thinking, however, whether lateral or horizontal, will not resolve the general confusion where software is concerned.

Software presents an area where meaningful evaluation and cost performance measurement are almost impossible. For a market-place reportedly worth $12 billion a year in the States alone, this lack of definitive guidelines is surprising; especially as it is now accepted, with but few reservations, that the cost of software will normally exceed related hardware.

Only senior company management have yet to be convinced of the facts of current DP life — that before long hardware will come gift-wrapped with every software package.

DP management are normally slow to respond to persistent *hardware problems. Equipment* is expected to perform at or above forecast peaks. Sleepless nights are encountered should the tape drive function at less than perfection. CPU activity is monitored with professional care and concern.

But this concern is not so evident in the case of software. An abortive run, after a three-hour processing run, is something to accept with tolerance. Blame is spread in all directions, with beams aimed at the user specification and subsequent lack of liaison.

Given such DP management feelings, it was rather surprising that a full complement of software vendors were present to defend their cause at a London branch meeting of the Institute of Data Processing Management.

The theme of the meeting — Are We Getting Software Value for Money? — was soon invoked, many DP managers being convinced that they were not. Software packages, it seems, often come labelled "poor," "bad" or "indifferent." Only the related price tags score high marks.

All too often, the installation is left holding the software bundle which in many cases has been designed with the requirements of a previous client in mind. In place of a tailor-made garment, the user has to contend with an ill-fitting application, any potential savings being lost in wasteful core storage, lengthy run times plus a general feeling of having been taken for an expensive software ride.

Such charges were strenuously denied by the assembled panel. Larry Levitan from Arthur Andersen suggested that software marketing was the last good example of free enterprise at work. The audience, however, thought that this particular enterprise was hardly in the "free" category.

The meeting did agree that DP managers should regard software packages as installation aids which, while presenting the user with limited options, offered a method of getting the application up and running in a practical period of time.

Comfort for the DP manager was not exactly the feature of the session. Ron Burrell of Zeus-Hermes agreed that establishing value for money is difficult, except where first-time or new users are involved. In general it was easy to define application packages. Defining each end user's requirements however is not so easy.

Vince Wells, of RTZ Computer Services, was firmly of the opinion that software packages must be constructed on a highly flexible format. Often, he stated, there were no alternatives to the package, except that of doing nothing. As in all installation applications, a teamwork approach was essential, with close liaison between the DP team, the end user and the software house.

Even chairman Hedley Voysey agreed that evaluation was an impossible science. Everyone wants more applications, more quickly. At the same time, the company wants to cut DP budgets.

A solution to the problem, it seems, has still to be unwrapped.

Ten years ago...

COMPUTER WEEKLY MARCH 20, 1969

THE most elaborate computer controlled structural testing project developed was being prepared to test Concorde, and it was estimated that Mintech would be spending about £600,000 on computers, monitoring equipment, analysts and programmers . . . A 32K ICL 1902A computer system, installed during one weekend, producing output on Tuesday and in full multi-programming operation on Thursday, was claimed as a record by Dorset County Council . . . The publication of the Cobol F specification by Ansi, expected at any time, would have far-reaching effects for both manufacturers and users on each side of the Atlantic, according to a Software File report . . . Eight small colleges and institutes in Pennsylvania joined forces to enable them to set up a time sharing network based on an RCA Spectra 70/46 .

1984 and all that . . . .

THIS week's example of the funny things people say in the media about computers was sent in by George Speivin of Clontarf, near Dublin, who wins £5.

According to the Calendar Reform Foundation, revision of our calendar could save accountthay operations alone £780 million. The inconsistencies of the calendar (such as whether the month has 28, 29, 30, or 31 days) "irritate" computers.

Advertising leaflet from G&C Communications.

Over 200 entries for DP athletics

NEARLY 220 entries have been received for the Computasters 79 competition, and teams from all over the country will be taking part in regional heats to win a place in the finals at Crystal Palace on Saturday, September 29.

The last two regional venues have now been fixed. East Anglia will be at the University Athletic Ground, Cambridge, on Sunday, June 10, and Thames North West will be at the Copthall Stadium, Barnet, North London, on Saturday, June 23.

All other heats will take place, as planned, except for Scotland, where a final decision will be made after all entries have been received. If there are not sufficient teams from that area to run a separate heat, competitors will be invited to take part in a heat in another region.

The first heat of the 1979 competition takes place in the Midlands on Sunday, April 8, at the Alexander Stadium, Birmingham.

Computasters is sponsored by Wright Air Conditioning and Computer Weekly and organised by Computasters of 117b High Street, Croydon, Surrey. Tel: 01-688 6680. Any team that has entered the competition but has not yet received acknowledgment should contact Computasters immediately.

Patent processing

PATENT OFFICE is to install CMC Sovereign multiprocessor keying system at its printing and sales office at St Mary Cray, Kent. It will process patent and trade mark application data for processing on the Department of Industry's ICL 1904S at Eastcote, Middlesex

IBM to introduce cheaper exchanges

COMPLEMENTING its 3750 PABX, IBM has announced the 1750, a cheaper version which will provide similar facilities for between 100 and 760 extensions and 96 exchange lines, compared with the 2,516 extension and 256 exchange line capacity of the 3750.

The price of the 1750 starts at about £70,000, compared with £150,000 for 248 extensions on the 3750. Extensions can be added to the 1750 at £700 each, falling to £400 in higher quantities.

Both systems use analogue crosspoint switching with reed relays and frequency division multiplexing. The 1750 is implemented in LSI technology and uses 64K RAM chips. Unlike the 3750 it does not need air conditioning or a false floor.

The 3750 is a key element in IBM's electronic office strategy and the availability of a cheaper device could bring many more users. Present installations in the UK are believed to number about 150.

The 1750 will be introduced next year in a small number of installations where it can be evaluated by the Post Office. It may then take two years to gain full Post Office approval, as did the 3750 between 1974 and 1976.

Both exchanges were developed at the IBM laboratory in La Gaude, Nice, France, and the 1750 will be made in Montpellier and Bordeaux.

The system comprises the 1751 switching and control unit together with up to five operator stations which can be 1755 desk top consoles or direct current versions of the 3755 operator desk, one of which is designed for blind operators.

A variety of peripherals can be attached to the system including floppy discs, printers, keyboard terminals, magnetic badge readers and radio pagers.

Television monitors can be used to display the status of extensions in a department, to help route inquiries or monitor unanswered calls. And links can be made to a mainframe to process control information.

The badge readers can be used for attendance recording, access control and security patrol checks. Attached processors can be interrogated, and respond with recorded voice messages.

Eclipse hardware, software enhanced

IN a flurry of hardware and software announcements relating to its powerful Eclipse based systems, Data General has introduced expanded memory capacities and cheaper MOS memory modules for commercial and scientific Eclipse machines. Cobol compatibility between AOS based commercial systems and DG's smaller CS series small business family has also been introduced.

The MOS memory for Eclipse machines now costs £18,816 per Megabyte, a price reduction of 53%. Maximum memory sizes on Eclipse C/150 and C/350 machines are now one and two Megabytes respectively, compared with the previous 256K and one Megabyte, and exactly the same increases apply to the S/130 and S/250 scientific machines.

With the commercial systems the Advanced Operating System, AOS, is now available on the bottom end C/150 as well as the C/350, and the existing AOS Cobol has been improved with the screen management extensions already provided with the Ansi 74 Cobol on CS systems. This Cobol compatibility should provide an easier upward growth path for CS customers.

Other software enhancements announced by Data General for *AOS systems include an easy file* inquiry utility called Infos query, a text entry and editing system, a word processing software option and a virtual data capability for AOS Cobol.

According to Data General, the latter facility permits arbitrarily large data elements to be defined in a Cobol program, enabling a program to be run that requires storage space which would normally exceed the address constraints of the user's address space.

The execution of Cobol programs with large amounts of code is already permitted by the automatic code segmentation facility announced by DG last year.

X25 package

THE X25 packet switched protocol which will be the standard for the Post Office's forthcoming Packet Switched Service, PSS, can now be supported by Data General Eclipse, Nova and Micronova computers using a software package called RDOS X25 Protocol. It can run on all RDOS/RTOS and DOS systems.

RDOS X25 is supported by Data General's DG/CS communications subsystems, including the DCU/200 data communications controller and its synchronous line multiplexers.

Storage Technology's back-end database aimed at 370 users

A BACK-END database system controlled by a 370-compatible processor with the power of an IBM 370/148 is under development at Storage Technology.

Designed primarily for use with IBM mainframes, it will look to the host CPU like a tape drive, and will be a sequential access system. The elements of the system will be the processor, a high-speed cache memory using charge-coupled devices, CCDs, for fast access, and the disc files.

Data will be positioned on the discs according to how frequently it is used. The discs will be banks of Storage Technology 8350 or 8650 drives.

The processor will probably be something like a Control Data Omega or Magnuson M80, but Storage Technology could also decide to build its own processor.

First deliveries in the US are likely to take place late next year, with European deliveries following six months later.

Peter Hewitt, our software correspondent, writes: Although described as a database system by a US industry observer, Storage Technology's new offering is unlikely to feature true DBMS software.

It could though be aimed at providing fast random access to very large sequential files, such as telephone directories. In this sense it would resemble ICL's back-end Cafs system, currently undergoing trials with the PO (CW, October 12, 1978).

Package tours to Telecom 79 in Geneva

TELECOM 79, the Third World telecommunications exhibition and conference, is to be held in Geneva, Switzerland, from September 20-26. The event is sponsored by the International Telecommunication Union and supported by the telecommunication administrators of the 154 member countries. The papers will cover the trends towards increasing telecomms integration and development of data transmission techniques. The technical and economic consequences of these developments will be assessed.

Special travel arrangements are available to Computer Weekly readers, arranged in conjunction with Commercial Trade Travel.

Three package tours have been arranged. Tour A, price £248, departs on Thursday, September 20 and returns on Sunday, September 23, Tour B, also price £248, departs on September 23 and returns on Wednesday, September 26. Tour C, price £348, leaves on Thursday, September 20 and returns on Wednesday, September 26.

The package includes economy class return flights by scheduled services from London (Heathrow), accommodation at the Hotel Beau-Rivage on Lake Geneva, all room service charges and taxes, and Continental breakfast.

Full details from Commercial Trade Travel, 8 Southampton Row, London, WC1. Tel: 01-405 8696.

Downtime by Chad

Party piece . . .

ARE people at parties forever asking you, "What are silicon chips?" They are me. What do you reply? Do you whisper your answer so as not to get that exasperated cry of "Oh no, not *computers*," from all others within earshot?

In my experience, computer people don't talk shop nearly as much as some. Teachers are the worst offenders. I avoid shop partly because I find there is only one subject that turns women off as fast as computers, and that is cars.

Nevertheless, I try to be helpful when asked about chips, as I was last Saturday. It was my party, and I happen to have a couple of dud silicon chips lying around, so I produced these surreptitiously, rather as one would show off dirty pictures.

What with the discord between murmurs of "coo-err" from some and cries of "BORing" from others, and my trying to think up a sensible answer to the question "How many people will that replace?" it was a salutary experience.

Strange device

A READER, John Walker of Reading, has brought to my attention an article in the Financial Times about "Charged-couple devices." He wonders whether it is the first quiverings of Spring that are producing charged couples, or whether this was a misplaced advert from Playboy — "Improve your sex life with a Charged-couple device!" I fear the FT meant "charge-coupled device." How sad.

Machines using microcoded rather than hard-wired instruction sets have become increasingly popular with manufacturers. As a recent account explained (Software File, January 18), one of the principal reasons is the greater scope thus provided for subsequent performance improvements. In the past few years, some minicomputer manufacturers have made microprogramming tools available to users. In this article, HARRY ATKINSON, of Sheffield Polytechnic, explains how user microprogramming can give a "customised upgrade" and outlines the steps involved in its application. Atkinson lectures on user microprogramming to final year degree students.

Microprogramming to give users a customised upgrade


Harry Atkinson

ONCE the user is committed to a particular manufacturer's system, he is usually also committed to the possible enhancement *paths offered by that manufacturer* in the form of upgrades.

Upgrades range from the minor, such as extra main store, to the major, such as the installation of the next more powerful processor.

Reasons for an upgrade vary. They include for example the need to remove a processor performance bottleneck, or to improve response times.

Whatever the reason, the user is constrained to the upgrade "packages" available, all of which usually contain *extra* features he does not require — for example extra I/O channels, or extra store addressing capabilities.

In the ideal upgrade, the user would get only what he required; it would be specifically tailored to his system; it would become his product to do with as he pleased; it would be installed when he liked, with the *minimum disruption*; and it would be extended when he chose.

A daydream? No, the technique used to achieve the above ideal is called "user microprogramming" and has been around since about 1972.

It gives the user the ability to engage in Wilkes type microprogramming and can remove the need for any upgrades in the life of the system.

What is Wilkes type microprogramming? In simple terms, *it consists of controlling the* operation of a system module — for example usually processors, but also channel controllers, peripheral controllers and DMA controllers — by a fast special purpose programmable computer.

The execution of a *single* machine code instruction is effected by the execution of *several* "micro-instructions" by the microbprocessor. For each type of machine code instruction the microprocessor has a sequence of micro-instructions the microprogram for that instruction type.

The complete set of microprograms for the instruction set, known as the "microcode" or "firmware", is held in the microprocessor's program store. *For integrity, it is often stored in* Read Only Memory (ROM) or Programmable Read Only Memory (PROM).

A dynamically alterable read/write version of the microprocessor's program store (Dynamic or Writable Control Store i.e. DCS or WCS) is usually available for debugging microprograms and for permitting the implementation of "firm" and "soft" machines.*

Nearly all modern computers are implemented in hardware using Wilkes type microprocessors, so that the provision of user microprogramming consists of making this *existing* facility available to the user. This is usually a marketing decision rather than a technical one.

Sadly, although user microprogramming of a general purpose mainframe is perfectly feasible, the facility is in practice *restricted almost exclusively to* minicomputers from manufacturers such as Digital Equipment, Hewlett-Packard, and Data General.

The usual way user microprogramming is used is to replace with microcode some time consuming function currently performed by software. This creates in effect a single new machine code instruction that replaces the code which performs the function.

The effect is to perform the function typically ten times faster and to release almost all the main store previously used by the software.

It is usual to replace whole subroutines in this fashion rather than sections of code, since the function and the data linkage is well defined in the subroutine specification.

The type of subroutine replaced can vary; it could be a system subroutine thus providing an operating system "assist", a compiler subroutine providing a compiling assist, a subroutine called by compiler generated code, a language execution assist or an application program subroutine (the user's own personal assist).

How does one microprogram? Firstly, one must make sure the system chosen supports user microprogramming.

Provided this requirement is met, user microprogramming follows five sequential steps:

```
* A USER CREATED VERSION OF THE SYSTEM SUBROUTINE IABS
*
IABS    NOP             ENTRY POINT
        SSA, RSS        SKIP IF A REG. CONTENTS –VE
        JMP EXIT        JUMP TO EXIT POINT IF A REG. CONTENTS +VE
        CMA, INA        NEGATE A REG. CONTENTS TO PRODUCE +VE RESULT
        SSA             SKIP IF A REG. CONTENTS +VE, NO OVERFLOW
        LDA MAXNO       LOAD MAXIMUM +VE NO. INTO A REG. OVERFLOW SET
EXIT    JMP IABS, I     EXIT FROM SUBROUTINE
*
MAXNO   DEC 32767       MAXIMUM +VE NO.
        END
```

Figure 1: A subroutine which implements the Fortran IABS function on the user microprogrammable Hewlett-Packard HP21MX M-series minicomputer. This subroutine is written in Hewlett-Packard Assembly language, occupies eight 16 bit words of main store and takes between 7.7 and 13.28 microseconds.

```
*-LABEL-><-2-><-3-><-4-><-5-><---6---><---COMMENTS ----------
        JMP                     IABS    ENTER IABS MICROPROGRAM
*-LABEL-><-2-><-3-><-4-><-5-><---6---><---COMMENTS ----------
IABS            PASS            A       PASS A REG. THRU ALU TO TEST IT
        JMP CNDX AL15   RJS     IABSEXIT A POSITIVE? YES EXIT
                 CMPS   A       A       }
                 INC    A       A       } NEGATE A REG.
        JMP CNDX AL15   RJS     IABSEXIT OVERFLOW NOT SET
        IMM SOV  HIGH   A       177B    CREATE THE LARGEST +VE NUMBER
                                        IN A REG.
IABSEXIT        RTN                     EXIT FROM IABS MICROPROGRAM
```

Figure 2: A microcode replacement for the subroutine given in Figure 1. This insignificant microprogram is written in Hewlett-Packard HP21MX M-series microassembly language, occupies eight 24-bit words of microprogram store, takes between 0.675 and 1.1 microseconds, i.e. is between 5.1 and 7.9 times faster and caused an 11% performance improvement in a small sample benchmark.

1 Performance Monitoring. The highest performance gains can be achieved if the most critical code is replaced by microcode. One can use one's intuition to select the most critical code, but this can be dreadfully wrong!

It is a good idea to identify bottlenecks in the system anyway, and a lot of manufacturers already provide software performance monitors for this purpose. Alternatively the user can quite easily create his own.

2 Microcoding. Having identified the most critical sections of code or subroutines, the function performed by this code is written in microcode — usually no more complex than normal assembly language.

The manufacturer normally provides a "micro assembler" which will run on a minimum host system to syntax check and translate the micro assembly language into the the microobject code (i.e. loadable microcode). An example of the microcode implementation of a software subroutine is given in Figures 1 and 2.

3 Debugging. Microcode has to be more thoroughly debugged than software since there are no run time checks to catch microprogram violations. (One exception to this is microcode stored in ROM or PROM, which is inherently write protected.)

The manufacturer normally provides two software tools to aid in debugging. One is a "micro simulator" which simulates the behaviour of the microprocessor hardware in software. The other is an interactive test harness (a "Micro-Debug Editor" or MDE) which provides an environment in which the microcode may be tested "live".

4 *Implementation: If the* microcode is to become a *permanent* part of the computer's instruction set then the microcode can be "burned" into PROM. This is done using PROM burning equipment supplied either by the manufacturer or by another hardware supplier. The PROM is then installed in the system.

An alternative approach is to use WCS and allow the appropriate microcode to be loaded into WCS as required. This creates a "firm" machine which can adjust its instruction set to suit the task being undertaken

5 Validation. Once the microcode has been developed and *installed*, performance improvements can be verified by benchmarking.

If the performance improvements observed in 5 are not sufficient then the cycle of steps 1 to 5 may be repeated until the required improvements are achieved.

If no significant performance improvements are forthcoming, an upgrade may need to be considered as a last resort.

It may be possible to achieve *significant performance* improvements initially by a judicious mixture of system tuning and selective recoding. This will entail undertaking steps 1 and 5 anyway, so that experience in the pre- and post-microprogramming activities can be gained in a pre-microprogramming performance improvement exercise.

The extra equipment required consists of only the writable control store (typically approximately £700), as all the software aids required are usually bundled manufacturer's software.

To summarise: by selecting a user microprogrammable computer an "invisible" upgrade potential is being acquired. Effective microprogramming can give significant performance improvements, and result in large main store savings. Individual machines can be tailored to suit the system job mix or any other job mix.

The activities associated with microprogramming, such as performance monitoring or benchmarking, can give the user a hitherto undreamed view of the operation of the system. There is in addition the possibility of having a "firm" machine which

● Turn to page 22

APEX REPORT WARNS ON JOBS, BUT . . .

Unions are urged to welcome WP

TRADE unionists should welcome word processing as part of the UK's drive for greater productivity, and should press for further development of our WP manufacturing capability. On the other hand, they should resist attempts by management to use word processing to eliminate jobs.

Those are the main recommendations of the working party on WP set up by white collar union Apex (CW, September 28 1978), whose first report is published this week.

The 68-page report, entitled "Office Technology — The Trade Union Response," aims to inform union members and officials about what word processing is, what the areas for concern are about it, and how negotiations with management over proposals for introducing it should be conducted.

The three areas of concern dealt with are: effects on employment, effects on job content, and health and safety matters. The most serious worries are expressed about loss of jobs for office workers, quoting one estimate that a quarter of a million jobs could disappear by 1983. A detailed strategy for dealing with employers on this issue is suggested.

The main plank of this strategy is a union policy that there should be no loss of jobs through the introduction of word processing, nor should a firm attempt to use WP to deal with an increasing workload without increasing staff.

Only this way, the report says, can the country's unemployment problem be solved. Job loss through natural wastage should be resisted too, it insists, because this *transfers unemployment to* school-leavers.

The extra productivity gained through word processing should be absorbed in increased output from the firm, Apex suggests, or in reduced working hours. Therefore management should be pressed to consider new products or expanded production of existing ones.

If job losses are unavoidable, the report suggests that the firm should be compelled to provide retraining for staff, or alternatively to pay them wages while they are unemployed, instead of giving a lump sum redundancy payment.

Loss of job satisfaction for secretaries transferred to word processing is a major concern of the report. Employers tend, it says, to centralise typing functions when bringing in WP and fragment people's work.

Staff should press to be allowed to participate in planning new arrangements, and should propose the setting-up of semi-autonomous work groups in place of typing pools.

Management should be required to provide more retraining for those affected by new technology, the report recommends. Detailed consideration is given to eyestrain and related issues, stating that there is no hard-and-fast evidence that VDU-watching is harmful, but that levels of ambient light and screen positioning are important.

Recommendations to the government include putting more money into Nexos and related prorelated projects.

Desk-to-desk switching

WITH half an eye on the potential future of electronic mail, Racal-ESL has introduced a new desk-to-desk message switching system, called Telplex.

Based around a switching system that uses AMD 2900 family 4-bit slice microprocessors, the system is being aimed at four main market areas of the message business (CW October 12, 1978). These are preparation, multiplexing, distribution, and storage and retrieval. The obvious initial market is the 68,000 Telex subscribers in this country — a figure that is growing at about 10% a year. The Post Office already has some systems for evaluation.

At the simplest level, the system can be used to provide message communications between offices in a single building. It can, however, cope with most commonly used communications protocols, and can therefore be connected to national and international switching systems.

There is already, according to the company, considerable interest in its potential as the basis of a distributed systems, and it might also be used as a satellite of the main message switching systems.

Racal-ESL is already working on a range of dedicated software operating systems for Telplex.

Govt watchdog allays scanner radiation fears

FEARS about high exposure to radiation from medical diagnostic CAT scanners, which have influenced the recent downturn in sales, have been allayed by a report from the National Radiological Protection Board — at least, as regards the EMIscanner.

The board, the government's watchdog on exposure to radiation, undertook a study of the subject with EMI's co-operation and concluded that exposure during a typical brain scan equals that needed for one or two X-ray photographs. Only if the scan is done in high-accuracy mode is the dose about five times as much.

In addition, the information obtained from either type of scan is superior to that provided by X-ray pictures, says the report.

The decline in scanner sales, most noticeable in the US which is by far the biggest market, has several causes, among them the attempts of the Carter administration to reduce government spending.

● EMI has filed a lawsuit against Pfizer for alleged infringement of its scanner patents, and is negotiating with several other US companies (CW, March 1).

Cosmetics firm opts for NCR

WITH a four-fold increase in turnover during the last four years cosmetics house Charles of the Ritz has decided to replace its NCR 31 and 399 accounting equipment with an NCR I-8250 system. To be sited at the company's offices in Burgess Hill, it has 128K of main memory, five VDUs and a 300 lpm printer. NCR's Interactive Distribution Control system package will be used to handle sales ledger, invoicing, and nominal/purchase ledger applications.

UN gives China $4m for large mainframe

AID for China approved by th United Nations Developmen Programme includes $4 millio for a large-scale mainfram together with training for staf It will be used primarily for th development of local expertis in the use, application and dev lopment of computers.

As with the other maj UNDP computer project, whe the agency is to provide Ind with a large-scale mainframe f its National Informatics Cen (CW, November 2, 1978), t computer will be chosen b UNDP by open tender with the world's manufacturers fr to bid.

More packages for CS family

A RANGE of business packag for the Data General CS fami of commercial systems has be introduced to the UK by DC International of Twickenha Middlesex.

MICHIE'S PRIVATEVIEW

Artificial intelligence six years on.....

IT is now over 20 years since the search for artificial intelligence began in earnest. The long and gruelling slog has been punctuated by occasional cries that the whole exercise is just an infantile disorder. A few years ago advice of this kind emboldened the Science Research Council to dismantle most of the coherent structure of UK work in this field, with effects which for a short time were felt even across the Atlantic.

The source of advice, Sir James Lighthill, distinguished both as a fluid dynamicist and in a more controversial sense as a government expert, is the departing occupant of Cambridge University's Lucasian Chair of Applied Mathematics.

Advice to governments has traditionally emanated from this chair, some of it of uneven quality. Professor Sir George Biddell Airy once advised Queen Victoria that if the Royal Salute were fired outside the Crystal Palace the building would collapse. More pertinently, Airy's advice secured the withdrawal of government support for Charles Baggage's Difference Engine.

In the case of artificial intelligence, American work soon resumed its rising curve. During my recent Stanford visit I saw evidence of a long-awaited phenomenon, namely commercial exploitability. This seems, then, a moment for taking stock. Was the advice sound? If not, what was the technical nature of the misunderstanding?

I have never personally believed that Sir James' advice sprang from shallow roots, although some of it was a little strange:

"Incidentally, it has sometimes been argued that part of the stimulus to laborious male activity in 'creative' fields of work, including pure science, is the urge to compensate for lack of the female capability of giving birth to children. If this were true, then building robots might indeed be seen as the ideal compensation! There is one piece of evidence supporting that highly uncertain hypothesis: most robots are designed from the outset to operate in a world as like as possible to the conventional child's world as seen by a man; they recognise pictures in drawing-books ('bear on rug with ball')..."

That's from Lighthill's 1973 paper on AI[1]. The "bear on rug" reference was to a paper on computer vision published in 1972 by Pat Ambler, Harry Barrow and Rod Burstall[2]. One of the pictures used to test their program had "Bear on rug with ball" as its caption. Lighthill continued:

"Nevertheless, the view to which this author has tentatively but perhaps quite wrongly come is that a relationship which may be called pseudomaternal rather than Pygmalion-like comes into play between a robot and its builder."

Lighthill divided the field of AI into: A — Advanced automation; B — Bridge activities, or Building robots; C — Computer-based CNS research and argued that B was getting nowhere and ought to cease. To AI workers neither A nor C is part of their subject. These are seen as application areas. As Professor Stuart Sutherland pointed out at the time[3], B should be for "Basic," the fundamental research that consistutes the heart of the subject.

In effect, then, B was for "Bad." After the half dozen years which have passed, I shall attempt a brief review of where B has got. It shall take my definition of B from a statement of aims made as the axe was falling in February, 1973: "*... the design of programming systems which can, to some degree, be made (a) 'teachable' and (b) 'self-programmable'.*"

"TEACHABLE" (BUT NOT "SELF-PROGRAMMABLE") EXPERT SYSTEMS

DENDRAL	— identification of organic chemicals
MYCIN	— diagnosis and prescription in meningitis
INTERNIST	— diagnosis in internal medicine
VM	— intensive care ("iron lung" management)
PUFF	— interpretation of lung tests
SACON	— guidance in package-using for structural engineers
PROSPECTOR	— geological consultancy for mineral prospecting

TEACHABLE EXPERT SYSTEMS WITH SOME "SELF-PROGRAMMABILITY"

BOXES	— balancing a pole under constraints
Program by de Dombal and others	— diagnosing acute abdominal pain
FREDDY	— visual recognition in hand-eye assembly
Meta: DENDRAL	— spectroscopic identification of keto-androstanes
AQ11 version of AQVAL	— diagnosis of soy-bean diseases
LISP implementation of CLS	— recognition of difficult chess end-game patterns

More than a dozen new "teachable" systems have since been developed, and a domain-specific methodology of "knowledge-based" programming has taken root. Since the function of each such system is to acquire and exercise expertise in some narrowly specified domain, these programs are referred to by the generic term "expert systems."

In the accompanying table only those items are included which show levels of performance of the given skill comparable to that of the trained human specialist. Those which are also to some degree "self-programmable" are sometimes said to exhibit capabilities of "rule-acquisition" or "inductive inference" or "learning."

But perhaps these all belong in some sense to A (Advanced Automation) rather than to B? Two inter-related touchstones apply: (1) **task-independent** teachability; and (2) **task-independent** self-programmability.

Significant progress has been made in both respects.

By stripping the medical knowledge out of MYCIN, a task-independent framework, EMYCIN ("Empty MYCIN") was created and used to develop in six man-months the SACON structural analysis system. As for autonomous rule-acquisition, all the cases listed are in various degrees generalisable.

How could these circumstances be missed by an observer of such exceptional scientific credentials? The answer turns on a misconception so prevalent even among computer people that one should hardly be surprised at finding it among physicists also. The misconception is that the relationship between artificial intelligence and the rest of computing is a difference in degree. I believe that it is a difference in kind, that it can be given a precisely quantifiable characterisation, and that to ignore it could run mankind into a technology of deep-seated user-unfriendliness. The following empirical manifestation of the difference is left as food for thought for the reader.

In standard computing there is essentially one user-mode only — getting answers to problems. An expert system has three:

1 getting answers to problems — user as client;
2 improving the system's knowledge — user as tutor;
3 harvesting the knowledge-base for human use — user as pupil.

Users in modes 2 and 3 are known as "domain-specialists." Why exactly their appearance on the scene necessitates novel forms of knowledge representation, intermediate between processor-intensive and memory-intensive, will be examined in a later Privateview.

Donald Michie

1 Lighthill, J. (1973) in **Artificial Intelligence: a Paper Symposium**, London: Science Research Council, pp. 1-21.
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3 Sutherland, N. S. (1973) in **Artificial Intelligence: a Paper Symposium**, London: Science Research Council, pp. 22-31.
4 Michie, D., Ambler, A. P., Barrow, H. G., Burstall, R. M., Poplestone, R. J. and Turner, K. J. (1973). Vision and manipulation as a programming problem. **Proc. First Conference Industrial Robot Technology.**

Philips to invest in SBS application packages

PHILIPS Data Systems has announced a £2.6 million investment programme to develop further application packages for its small business computers, office computer systems, and electronic accounting systems.

Spread over four years, the programme is to concentrate mainly on industry-specific applications such as accounting packages for solicitors.

Philips also plans to develop a number of industry-specific packages.

One project specifically identified is a building society system based on the PTS 6000 financial terminal. This would join its existing PTS 6000 package Laser, which has enjoyed considerable success with local authorities.

Accounting package specialist enters European market

WITH the aim of taking a major share of the European market for mainframe accounting packages, the giant US software house Management Science America has set up a subsidiary in the UK — the first time it has been represented in this country.

MSA is almost certainly the world's largest supplier of software for financial applications, with a worldwide customer base of about 3,600. Last year it had a turnover of $25.6 million and employed nearly 460 staff.

In Europe, the company is probably best known for its Alltax payroll subroutine, which features every year in Datapro's software Honour Roll.

Alltax, though, is just the tip of the MSA iceberg, which consists of eight major packages covering the whole field of financial and management accounting.

Two of the strongest selling systems are those for general ledger and payroll, each of which has over 1,000 users. They are complemented by systems for accounts payable, accounts receivable, fixed asset accounting, financial modelling, inventory and purchase order control, and personnel management.

All the software — which is written in Cobol — is targeted primarily at IBM mainframe use, with other users accounting for something like 20% of the base. Other manufacturers supported include Burroughs, Honeywell, NCR, Univac, and DEC.

In the UK, though, MSA expects as much as 50% of its customers to be ICL 1900 and 2900 users, and has assembled a development team at its Slough office to convert the software appropriately. Little modification is thought to be required to meet European accounting standards, with the exception of VAT, for which significantly more flexible provision is essential.

All the packages are customised via parameter tables, to the extent that MSA will not undertake source code changes when installing them. It will, however, show users where to link in specialised modules, subsequently supporting the system at an unchanged level.

MSA regards online access to information as of prime importance and offers optional online modules, based on CICS, with most of the systems. They can also be run in pure batch mode.

The opening of MSA's UK office follows the establishment 18 months ago of an MSA office in Brussels; this serves Belgium, Holland, and Scandinavia. The UK office will for the moment handle sales in all remaining European countries and is budgeted to earn £750,000 in 1979 out of a total overseas revenue of £1,500,000.

50th Midas goes to Mexican bank

THE International Mexican Bank has become the 50th customer for BIS Software's Midas system. Launched three years ago (Software File, January 8, 1976), Midas is designed for the dealing operations of international banks and is now usually installed on IBM System 34 hardware.

SPSS-10 package

SPSS-10, the DEC version of the Statistical Package for the Social Sciences, has been installed by Rapidata on its international network.

Puzzler

THIS little multiplication sum contains all six digits from 1 to 6. Can you reconstruct it with just that limited amount of information? If not, turn to page 61 for the solution.

By Peter Hewitt

End-user language for PDP-11

ANOTHER near-English programming language designed for use by non-professionals has arrived on the market, this time from Filetab Support Services, the company originally established to provide consultancy and training to users of the NCC's Filetab.

Initially available only on the Digital Equipment PDP-11 and LSI-11, the new language is called Probe and is built on the RPL programming language introduced by FSS last summer (Software File, July 13, 1978).

Probe is a file inquiry language and works by generating an RPL source program. Thus although it is targeted primarily at simple retrieval and reporting tasks, more complex applications can be addressed by linking in existing RPL modules.

A key feature of Probe is the data dictionary, which includes security features, provides automatic headings and field editing, and has facilities for the re-definition of fields.

The software runs either interactively or in batch mode under RT11, RSX, or RSTS/E, and will be available in April. It is priced at £1,250 to existing RPL or Sprint users, and at £2,150 to others.

Versions are planned in the future for the IBM System 3 and 32, 360 and 370, and for ICL 1900 and 2900.

Altergo time sharing system opens new era for OS users

OPENING up a new era of low-overhead time sharing for IBM OS users — and possibly giving a fresh lease of life to OS/VS1 — Altergo Software has launched a high performance replacement for TSO that runs under all OS versions and offers dramatic savings in resource use.

Of particular significance is that the new system is available under VS1, which accounts for an estimated 50% of OS sites, yet does not support TSO.

Called Guts, the system should also appeal strongly to SVS and MVS users, notably because of the major economies possible.

According to Altergo's David Brownlee, those converting from TSO to Guts save at least 75% of previous disc space requirements, a minimum 90% of memory, and about 80%-90% of CPU time.

"In a typical shop with around 15 time sharing terminals, you could have a TSO region of anything between 1½ and 3 Megabytes. Under Guts, the same workload could be supported with a region of 80K.

"An additional region of between 150K and 200K would be needed for Guts' interactive execution feature, giving a total of around 350K in a typical installation."

As with TSO and CMS, the prime application for Guts is in program development. Anything that can be run under TSO can also be run under Guts, which provides full support for both interactive compilation and execution.

The system also supports CRJE, with interfaces to Hasp and JES.

Facilities for handling JCL are an important feature of the system, with a syntax checker provided as standard. This operates even in CRJE mode and is complemented by a JCL processor, which allows JCL to be generated quickly by editing standard installation sets.

A highly regarded feature of Guts is its simple command language, making it in addition a potential alternative to VSPC. Sequences of commands can be stored as Guts procedures and Altergo is to supply a starter set of useful procedures as standard.

Other notable features include a document processing capability; an interactive basic compiler; an OS data set catalogue maintenance system; and a set of 30 high-performance OS utilities.

Guts was originally developed by Gothenburg University, Sweden, and has up till now been available from a Gothenburg-based software house, Modulföretagen Väst AB.

Its use though has been restricted in the main to universities, which account for 8 of the current 11 installations, and to MFT and MVT environments. A notable UK user is Unilever Computer Services, which installed Guts in 1977 as a replacement for Rosco (Software File, January 5, 1978).

Over the last year, Altergo has worked closely with Gothenburg University on the development of VS1, SVS, and MVS versions. It has also "packaged" the system, with the result for instance that installation now takes three hours instead of three weeks.

It sees service bureaux constituting a significant early market, along with TSO users that want to expand the number of time sharing terminals supported. Other important market sectors will be VS1 installations, and the large number of 360 users in the US still running MFT and MVT.

The basic entry level system is priced for the moment at £12,000 and includes CRJE facilities; JCL syntax checkers and processors; a Guts procedure library; the OS dataset catalogue maintenance system; and facilities for text editing and document processing.

The time sharing option, which includes interactive compilation and execution and a TSO compatibility feature, is available for £8,000.

Other options are the interactive Basic compiler, priced at £2,000, and the utilities package, priced at £3,000.

These prices, though, are likely to rise significantly when an initial user base has been established. Brownlee is looking to sell around 100 systems in the first year, with some 200 to 250 per year subsequently, and is likely to revise prices when the first 50 have been sold.

Guts is available immediately for all versions of OS except MVS. The MVS version will be released very soon, as will a Guts/Shadow II interface; this will be a software switch enabling a terminal user to pass from one system to the other without having to set up a new region.

Also under development is a full-screen editor.

PROGRAMMER NOTES

SOFTWARE portability receives much attention in the computer Press and is becoming of concern to some big users — notably those which have already funded large conversion projects.

At the application program level, the requirement for portability is behind much of the language standardisation effort. It is also the rationale for such system software development as Tripos and MicroCobol.

Yet portable software would probably come very low down the list of the typical programmer's interests. This is a shame, as one frequently overlooked concomitant of portable software is the "portable programmer."

Even a cursory scan of the recruitment columns brings home the fact that programmers are usually required to have experience specific to language, operating system and hardware.

This, if nothing else, would warn even a novice of the falsity of "Cobol is Cobol is Cobol."

So just think of the freedom of opportunity in a world of truly portable languages and operating systems. In the words of the song, "Don't know much about history, don't know much about geography . . . What a wonderful world it would be."

OP SPOT

By Bernard Allen

HINT OF THE WEEK

Versatile hardware

LET'S not underrate hardware when we are considering ways of operating in a more efficient manner. Take the IBM 3330 disc drive, for example.

Now the units come in banks of up to eight (with a control unit) and are interchangeable within their banks, because each bank has eight address pods which may be slotted into any of the units.

This is useful when, for example, an operator has placed two discs on the units and specified the wrong unit address when entering the Mount commands at the console.

Instead of changing the discs physically, the operator merely has to switch the address pods. And there are many other applications.

Clothes issue

I HEAR that a recent Op Spot piece concerning the dress of operations staff did not go down well at an installation not a million miles from Wembley Stadium.

Apparently the general consensus of opinion was that the subject matter was too trivial and of no particular interest to operators.

I disagree. In my view it is a real issue because operating involves physical work and the collar and tie type of attire is not always suitable.

If any of the operators at that site wish to discuss the matter or anything which has appeared in this column, I welcome their calls and letters.

Eye tests devised for VDU screen problems

AS experts on the subject now generally agree that a lack of attention to ergonomics and defects in the sight of the operator are the likely causes of VDU-related problems, the following should be of interest.

A series of tests intended to exercise eyes in a manner similar to the process involved in reading characters from a VDU screen has been devised by Warwick-Evans Optical, an optical and scientific instrument manufacturer based in London.

They consist of a set of cards which are used in conjunction with the Keystone Vision Screener, an optical instrument marketed by the company.

Paul Unger, technical director of Warwick-Evans Optical, says the tests are simple to administer, calling for no special medical skills from the examiner.

And if sight defects are discovered, the person concerned can then go to an optician for professional attention.

For further information contact Warwick-Evans Optical Co, 22 Palace Road, Bounds Green Road, London N11 2PS. Tel: 01-868 0051.

Welcome for bank plan to phase out shift allowance

FOLLOWING discussions with the National Union of Bank Employees, Barclays Bank International is to implement a scheme to help members of its staff overcome the loss of allowance in the event of moving from shift work.

The bank intends to phase out the allowance over a nine-month period, instead of taking it from the operator as soon as he stops working shifts.

Terry Molloy, of NUBE, told me, "We consider this a major breakthrough. Now that Barclays Bank International has accepted, we hope that others will follow suit.

"Operators at bank installations in general are being asked to work more and more unsocial hours, so shift allowances are rising accordingly. It is, therefore becoming progressively more difficult for the operators to give up their allowance. A scheme such as this should help career progression."

Discussing the details of the scheme, he continued, "The operator will get the full allowance during his first three months off shifts. For the next three months he will get 60% of the allowance, and for the final period, 30% of it."

BARRY JOHNSON ... "We give the operator a rise to offset the shift allowance being taken off."

The idea of phasing out shift allowance is not new although, in my experience, this is the first instance of its actually being accepted by management.

Shift allowances has always been a source of discontent among operations staff, and caused considerable disagreement and ill-feeling between them and management.

In relation to career progression, some consider that the allowance should be kept to a minimum, with the emphasis on a high basic salary. One such person is Barry Johnson, operations manager at Univac's benchmark centre in West London.

Johnson said, "We like to keep our senior operator and shift leader positions pretty fluid. We look to move two people out of the operations department each year.

"For that purpose we pay a higher than average basic salary and keep the shift allowance to a fixed sum of £480 a year."

And the person concerned is moved out of the department at the time of his annual review.

Explained Johnson: "Then we can give the operator a rise to offset the shift allowance being withdrawn. This method has always worked very well for us."

Another manager suggested that shift allowance should be saved by the company and given to the operator in a lump sum when he leaves the department.

To me, that's fine in theory but not in practice as the basic salary paid to most operators just is not high enough.

Homeless and jobless after break-in?

TWO Birmingham terminal operators could be homeless and without jobs by the end of the month as a result of thieves breaking into their flat.

In addition to £300 worth of goods, Alison Hunt and Meg Nicholl lost flight tickets which were to have taken them to Spain in search of jobs in the sun.

They had already given notice at Overseas Containers, where they work in Birmingham, agreed to leave their flat by March 29, and packed up most of their possessions when the break-in occurred.

Alison told me, "The company had already found replacements for us, and we can't go to Spain because we don't have the money or the tickets."

However, they have now got over their initial disappointment and are hoping to get work at a seaside resort in this country.

"We have applied for jobs at Butlins, starting next month," said Alison.

Call for papers

THE fourth European conference on electrotechnics, Eurocon '80, will be held in Stuttgart, from March 24-28, 1980. The theme is to be Electronics to microelectronics, their trends and applications. Papers are invited for presentation at the conference and abstracts of not more than 500 words should be sent before June 30 to Professor Dr W. Kaiser, Chairman Program Committee Eurocon '80, University of Stuttgart, Brattscheidstrasse 2, D-7000 Stuttgart 1, Germany.

Romanian trade fair

SYSTEMTECHNIK '79, the internat... trade fair for electronics in Bucha... man authorities are expecting... 50,000 experts from their country to... the exhibition, which gives suppliers... opportunity to promote the sale of... products in Romania. Members of... ested countries can also meet repr... from the Ministry of Foreign Tra... Bucharest in April.

Details from Gisela Interna... 1700 K Street NW, Washington D... 20006, USA. Tel: 202 659-0537.

CONFERENCES

EMK Munich

EMK, the fifth European Microfilm... gress, will be held on the Munich fa... grounds from September 17-21, at... same time as the System '79 data-p... exhibition. The programme for the... covers seminars on applications in... generation, commerce and indust... banks, the medical sector and t... administration. It is organised by t... German Photographic Industry Asso... tion of Frankfurt and the AWV cent... for economy in private and pub... administrations. Details from Kruge... Info-Systems '79, EMK '79, Kruge... trum München-Messegelände, Post... 12 10 09, D-8000 München 12, Germa...

Finite elements

FINITE element systems is the subj... seminar to be held by the Computer... Mechanics Centre in Southampton... June 6-7. It is designed to demonstr... capabilities of various systems sold... intending users the opportunity... meeting representatives of the dif... packages. Details from the Comput... nal Mechanics Centre, 125 High S... Southampton SO1 0AA. Tel 0703...

James Martin

NEW DP environment and how to... for it is the theme of a five-day se... be given by James Martin. It de... es to provide managers and system... lysts with the insight necessary f... planning and designers with the... efficiency and costs. James Mart... speak in Miami Beach from March... in Toronto from April 23-27 and... Francisco from April 30 to May... mation may be obtained from Tak... Transfer Incorporated, PO Box 6... Angeles, California 9006... 213 476 1331.

Microprocessors

ASLIB is organising a seminar o... processors and intelligence, to be... from May 14-15 at the Holiday... Slough. Speakers will include Dou... lee of Rank Xerox, and Peter Finch... Programmes, registration forms a... other details can be obtained from... Conference Organiser, Aslib, 3 Bo... Square, London SW1X 8PL. Tel 01-2... 5050 ext 41.

Architecture

THE international conference on ... application of computers in architec... building design and urban planning (A... '79, will take place in Berlin from M... 7-10. The conference, which has as ... main theme 'Building for the 80s, before... designed to appeal to the urban plan... and the architect with or without c... puter knowledge. Further details f... On-line Conferences, Cleveland Ho... Uxbridge, Middlesex.

IMC 79

MICROGRAPHY and everyday life ... be the theme of IMC 79, the third ... International Micrographic Congre... The congress will be held from Septem... 24-27, in Paris, together with the fou... ational Exhibition on data memory, ... communication and office organisa... IMC 79 is organised jointly by Syndi... CIMAR manufacturers and farms o... pliers in micrography. Specialists fr... different countries will present revi... the art of micrographic systems and ... their applications, at the Palais des ... Rres, Porte Maillot. Information on ... IMC 79, 6 Palais de Vitré, 75116 ... France.

Search

THE fourth Search International ... posium is to take place in the Inter... nal Inn, Washington DC, from 30 ... Representatives from 40 over-the-co... will give presentations on computer ... information and associated servic... ditional information from Mrs Jane ... Information Manager, Search Group, Inc, 1620 35th Avenue, Sacramento, California

Burroughs' terminal line uses the 8086 16-bit micro

FIRST manufacturer to adopt the celebrated Intel 8086 16-bit microprocessor for a major new line of data processing products is Burroughs.

The new Intel chip is the central element in the Burroughs Modular Terminal, BMT, series which currently features three models, two aimed at the banking market and the third for general data entry applications (CW, February 8).

The new Burroughs line follows the lead set by European manufacturers like Nixdorf, Datasaab and Philips, and although not as revolutionary as Nixdorf's Data Telephone (CW, November 10, 1977), the BMT series marks a substantial step forward in terms of the range and variety of display, keyboard, printer, and special function modules from which the user can configure each workstation to his precise requirements.

The general purpose model is the MT 600, designed for use both as a remote batch terminal and for interactive communication with the host computer. In the initial release there is only 20K bytes of user memory, and no local computational facilities, but in the forthcoming release, user memory increases to 96K bytes.

A Burroughs Forms Definition Language, described as Algol-like, is offered with the MT 600, and is designed to be used by non-specialist operators.

The MT 600 is offered with 12in 2240 character CRT display, alphanumeric keyboard, and optional dual micro-floppy disc drive. The drive was developed by Burroughs, uses a 4½in diameter disc carrying 80K bytes for a total capacity of 160K on the unit. A journal or a journal plus document validation printer can also be attached.

In each of the modules the microcomputer is built into one of the modules. On the MT 600 it is in the display, as it is on the MT 200, which comes with three screen options.

These are 5in, 9in, or 12in displays, each with a 600 character capacity. Alpha, numeric, or alphanumeric keyboards, 4½in or 8½in matrix printers, magnetic stripe card readers and a personal identification keyboard are offered as options.

In the case of the MT 300, the 8086 is built into the printer, which is a 90 chps bi-directional buffered printer capable of white-on-black as well as standard printing, and includes a numeric keyboard with 40-character strip display. Peripherals which can be attached include a 5in, 9in or 12in CRT monitor, magnetic stripe reader and identification keyboard.

BMT systems are compatible with all Burroughs communications protocols, and commonly-used IBM and other protocols are under development.

Use of the 8086 means that the series is capable of substantial enhancement as it matures, and Burroughs says that with use of a portable "microexecutive" the 8086 can be replaced with other microprocessors in the future.

IBM look-alike cuts VM overheads

● From front page

architecture" of the Magnuson machines, which is designed to make them easily reconfigurable to emulate any processor for which the company has developed microcode, this would *in theory* enable the company to come up with microcode to match any new IBM announcement within weeks and once ready, transform all its installed systems to the new specification overnight.

Itel, longer established in the IBM look-alike business than Magnuson, has provided VM Assist microcode on its systems for some time and supplies different versions with its three basic models, the AS/6, the AS/5-7031 and the new AS/3-5, Itel's answer to the IBM 4341.

Itel says that the implementation of the most frequently used parts of VM in microcode reduces the VM overhead from 80% to 20% when running "guest" operating systems. But Itel points out that the Extended VM Assist on the AS/5-7031, Itel's more powerful alternative to the IBM 3031, brings it down to 10%.

However, Itel feels that 10% is low enough. It would probably need to double the amount of microcode just to reduce the overhead a further 1% because the less frequently used parts of VM that are not microcoded at present are much bigger than the microcoded parts.

Although configured into models for marketing purposes, Magnuson's M80 is effectively a single system which can be upgraded by adding circuit boards at the user site across the power range of several IBM 370 models to a present maximum of 16 Megabytes and 16 channels.

The M80 was designed from the start to accommodate new technology in modular form as it becomes available. The theoretical main memory limit on the M80 is 4,000 Megabytes.

The architecture enables Magnuson to emulate mainframes from manufacturers other than IBM, though the company says that minicomputers will be emulated next.

The $15,000 per Megabyte memory will be available from Magnuson with the three new machines that the company intends to start building in the second quarter of next year. Magnuson wants to lag IBM's first 4341 delivery by three months to make sure that the machines are 100% compatible with 4341. Magnuson says that it must wait until IBM releases software and data channel details before finalising its production modules.

The three new Magnuson machines are the M80/32, the M80/42 and the M80/43, the latter said to offer a performance 130% of the 4341. Magnuson quotes a purchase price of $315,000 for a two Megabyte M80/43, which gives it a price/performance as good as a 4341.

Magnuson says that it is now planning an extension for the M80 series that will put its upgrade range higher than the level projected for IBM's next 4300 series model.

Magnuson systems are already being marketed in Europe by Magnuson ATC, of Henley-on-Thames, an agent that is mainly interested in selling to the air transport industry.

Data General launches the Dasher series

A FAMILY of 180 chps matrix printer terminals called the Dasher TP2 series has been launched by Data General. The TP2 units come in keyboard send/receive and RO versions costing £2,820 and £2,386, respectively.

Each TP2 contains a 16-bit Data General Micronova microprocessor which is used to control the various printing functions, including bi-directional printing with logic seeking of the next print position. The TP2 also incorporates a buffer with 1,000 words of RAM to facilitate communication at 1,200 baud.

Characters are formed from a 9 x 7 matrix using a nine wire print head and other TP2 features include switch selectable eight lines per inch printing, which squeezes 88 lines on to a standard 11 inch form.

Scope range

SCOPE Data Systems, of Sheffield, is to market a range of machines to replace all the Flexowriter systems formerly made by Singer Friden. Made by Computron at Nijmegen, Holland, the systems software is microcoded.

By Judith Morris

Barron

Keast

Director of Jermyn

Peter Barron has become managing director of Jermyn Manufacturing. He previously worked for 13 years with Texas Instruments, where his last position was that of manager of the company's IC department. He takes over from **David Padley**, who becomes group operations director.

Maureen Keast, an executive director on the board of the software services company, Pamela Woodman Associates, has been appointed general manager of that company's southern division. She was formerly production manager for PWA.

Robert Degan has been named president of Applied Digital Data Systems. He has served as executive vice president for almost two years, and will become chief operating officer. **William Catacosinos** continues as chairman of the board and chief executive officer.

Lynn Leier has been appointed vice-president of Documation Incorporated. He was previously US North East regional field engineering manager, based in Greenwhich, Connecticut.

Dale Roark has been appointed by Megatek Corporation as product manager for graphics systems. He was an applications engineer at Calma Interactive Systems in Chicago, before joining the company.

Memorex appoints third vice-president

MEMOREX has named **Charles Strauch** to join Robert Wilson and James Dobbie as executive vice-presidents. Strauch will have responsibility for Memorex's two international marketing groups, Europe, the Middle East and Africa, and the Americas and Asia. He will also control the consumer and business media group, the computer media group and corporate marketing.

Prior to joining Memorex, Strauch was executive vice-president of Gould and before that was self-employed as acting president of TAL-CAP. He has also served as assistant to the president at the first National Bank of St Paul, and holds a degree in Industrial Engineering from Lehigh University in Pennsylvania.

Strauch succeeds Robert Jaunich who left Memorex to become president of Shasta Beverages.

Jack Ackerman, director of Philips Industries and former managing director of Mullard, has been appointed chairman of the Electrical and Electronic Manufacturers' Training and Education board.

Mailly

Harper

Lucy Harper has been appointed by Redifon Computers as a junior systems analyst for the Southern branch. She was formerly operations adviser for the company. Junior systems analyst for the Financial branch is **Janet Holmes**, who was previously programmer/analyst with NCR.

Ian Mailly has become territory manager for CMC, based at the company's Croydon office and responsible for sales in Kent, East Sussex and part of the GLC. His last job was with NCR Nigeria where he was a salesman.

John Butler has become a field sales manager for London United Computing Systems. He joins the company from the Network Information Services division of Honeywell, where he was sales manager in charge of the Mark III service.

Brian Willcocks has been appointed group data processing controller for Sutcliffe Catering (Midlands). He formerly worked freelance running business courses and lectures, and is a member of the Institute of Management.

Nik Gibson has joined Computel as a member of their sales team. He was formerly in the 2900 sales department of BOC Datasolve.

Peter Dawson, previously section manager with Texas Instruments, has been appointed by Compeda as senior consultant on the software system Gaelic.

Brian Sutton and **Michael Dixon** have been appointed to expand the interests of United Computing Systems in Europe. Sutton, who was formerly marketing and technical support manager for LUCS, becomes European corporate planning manager of UCI, and Dixon is to be European sales manager. He was previously sales manager with LUCS.

CHAIRMAN of the Post Office, Sir William Barlow, took a close interest in the US built Transtel electronic teleprinter when he visited the Post Office telecommunications service centre at Pimlico in London. Sir William is seen here discussing the Transtel unit with Richard Martin, the engineer in charge of the London south central area telegraph workshop.

The Post Office offers the Transtel unit to users of private teleprinter circuits as an alternative to the 2300 series electronic teleprinter built by ITT Creed of Brighton. But Transtel units are not available for use on the public telex network. The PO ordered 12,000 ITT 2300s last year for the public network.

Stuart Radley has been appointed to the new post of marketing support manager for the Honeywell Page Printing System. He has been a principal technical adviser for the past 14 months at the PPS organisation at Hammersmith.

Peter Brown has joined CTL as software product manager in the design division. He was previously with Plessey Telecoms, where he was manager of the system software department.

Hal Becker has been appointed manager of communications and distributed systems with Advanced Computer Techniques, based in Phoenix. He joined General Electric in Detroit in 1959 where he was involved in programming the IBM 650, 305 RAMAC and early GE 200 series equipment.

Bob Butcher has become territory manager with CMC's sales team. He was formerly a programmer on the 903/905 military systems at Elliotts, Borehamwood.

Stirling profile

SENIOR lecturer in computer science at Newcastle University, Les Wilson, has been appointed to the chair of Computing Science at Stirling University. He has been a lecturer at Newcastle since 1971, and previously worked as a senior scientific officer with the Naval Construction Research Centre in Dunfermline. A fellow of the BCS since 1966, he has written several articles and papers on the subjects of data structures and compilers.

Christopher Toone has been appointed a director of Auchinclos Britain, responsible to the group director for all aspects of data processing. He was formerly a director of Hoskyns Systems.

Ken Philcox has been appointed by Amplex International as a sales executive for Europe, Africa and the Middle East area. He was formerly co-ordinator of special projects at Dresser Communications.

Philip Major has been appointed Tesdata's general manager for the UK, Scandinavia and Holland. He was previously a manager of the European operations for the company. Formerly a salesman, **Roger Clark** has become UK branch manager and **Roger Todd** has joined Tesdata as a technical manager. He worked until recently for the West German software house, Datenkonsultant. Ian Marchbanks, previously a salesman for Scandinavia, has become Tesdata's branch manager for Holland and Scandinavia.

DIARY

MARCH 26-27

Business Game. BCS Nottingham branch Book team, through March to Monday. Cripps Computing Centre, Nottingham University, Nottingham. 19.30

MARCH 26-30

European Computing Review. Infotech. The Connaught Rooms, London. Contact Dave Bates: 0628 35011

Achieving project plans, seminar. Association of Project Managers, Jersey. Details APM, 01-769 3182

MARCH 27

The influence of computers on the teaching of electromagnetism. IEE Measurement group, Savoy Place, London, WC2. 16.30. Details: 01-240 1871 ext 227.

Funding of microprocessor projects. BCS Microprocessor specialist group, Polytechnic of Central London, Regent Street, London W1. 14.00.

DVLC, a second chance. John Gibbins, BCS S Wales branch, Bear Hotel, Cowbridge. 19.00.

Microprocessors. IEE BCS N Wilts branch, Westinghouse Brake and Signal Co, Chippenham. 17.30.

Presto. K. E. Clarke, BCS Leeds branch, CFCD, Harrogate. 18.15.

MARCH 27-28

Trends in online computer control systems, conference. Institution of Electrical Engineers, et al, Rammoor House, University of Sheffield.

MARCH 28

Design by objectives: a structured program-architecture method, Tom Gilb, BCS Cobol Specialist group, Clarke Hall, Institute of Education, Bedford Way, London WC1. 14.15. Admission by ticket. Tel: Derek Shuttlewood 0401 64164.

UFOs — a technologist's view. G. F. N. Knewstub. IEETE. The Royal Hotel, College Green, Bristol. 19.30.

MARCH 29

Process control. BCS. London School of Economics, London WC1. 17.30.

Presteel. BCS South West branch. Royal Naval Engineering College, Manadon, Plymouth. 19.00.

MARCH 29-30

IBM CUA Programming group. Royal County Hotel, Durham. 14.00.

MARCH 30

- software validation techniques for microcomputer systems. BCS microprocessor application group. Details: 01-240 1871 ext 227.

APRIL 1

Visit BCS Preston branch. Venue announced. Details R C Bell 061 774 9211 ext 41 (London restricted 19.30.

APRIL 2

Computer networks P I Computer Applications and Group, Institution of Civil London SW1. 18.00

Computer security — what where next? I. Taylor, BCS and Glos branch Queen Hotel ham. 19.30

Current IBM developments BCS Bedford branch Swan ford. 19.30

Computers for weather fore Adams, BCS East Anglia branch Union Offices, Surrey Street, 19.00

APRIL 2-3

Research colloquium in information retrieval BCS Information Group, University of Aston Birmingham, Birmingham.

APRIL 3

Trainers for you. P. J. Hayle, BCS London branch, Railway Hotel, Field Lane, Greenford, Middlesex

Word processing. Dr P. J. Cohen Birmingham branch, Wheatsheaf Coventry Road, Sheldon. 19.30

APRIL 4

The distributed array processor applications. Dr R. W. Goetz, BCS Wessex branch, The Tabby Cat, Chandler Ford. 19.00.

Annual visit to a COM user and manufacturer. BCS Microform group. Details from W. B. Edmead, New Lea Road, Berks.

Installation visit to British Rail Eastern Region, Doncaster, BCS Deeside branch. Thursday, Dec 4. Jennifer Barker on Middlesbrough 5 ext 2363.

APRIL 5

The changing emphasis of computer education. BCS West Riding branch, Hatfield Polytechnic, Hatfield. 19.30

Microcircuit engineering. Drill for IEETE. Leisure Theatre Co, Isleworth. Engineering Department, Trumpington Street, Cambridge. 18.45

Discussions on film. Now or Never. Down, equipment demonstration. Merseyside branch/Institute of Measurement and Control, Liverpool College of Knowsley. 19.30.

Liveware Saga

by Dek

Digital boosts its LSI-11 range

A POWERFUL addition to the LSI-11 range of microcomputers has been introduced by Digital Equipment. It offers four times the memory capacity of the LSI-11/2, and is between two and five times faster. Known as the LSI-11/23, the system features the full instruction set of the PDP-11/34 minicomputer, while being able to run all the software available for the LSI-11 range.

The LSI system is board-based, and DEC has also introduced a boxed, rack-mountable version, called the PDP-11/23. This is seen by the company as an upward extension of the existing PDP-11/03.

Both systems can address between 64K bytes and 256K bytes, though a memory management chip is required for capacities over 64K bytes. They are plug-compatible with all PDP-11 input/output devices, and can also run the RSX-11M and RSX-11S operating systems.

The heart of the new system is a 16-bit, microprogrammed CPU chip that incorporates all the standard PDP-11 registers, working registers, processor status word and ALU, all interconnected to a 16-bit data path. This allows the majority of operations to be executed in one machine cycle.

The microcode for the processor comes from a 552-word control chip. This contains all the code necessary to emulate the entire PDP-11/34 instruction set. It also incorporates the code for the system monitor, known as the Octal Debug Technique (ODT).

Both these chips are mounted on a single hybrid chip carrier that plugs directly into the LSI-11 bus.

The optional memory management chip offers three functions, relocation, segmentation and hardware protection, when memory capacities over 64K bytes are required. Both relocation and segmentation are typical features of systems like this, but DEC claims that hardware protection is a rare feature to offer in 16-bit micros.

The protection is achieved by controlling the type of access made to the physical locations given by the memory manager to the 8K byte segments.

Also an option is a floating point processor capable of working in either single or double precision. In addition, it allows selection of integer lengths between either 16 bits or 32 bits. Working with the FP11 instruction set, and six, 64-bit floating point accumulators, execution speeds are increased over the LSI-11/2 because fewer bus transactions are required.

Harris adds SNA package for 1600

FULL compatibility with IBM's 3776 and 3777 remote batch terminals for Systems Network Architecture has been announced for the Harris 1600 line of remote terminals.

The Harris products, which are built around Interdata 7/16 minis, emulate the IBM devices using a Harris software emulator called EM 3777. This package supports up to 10 logical units, and enables SDLC communication to be carried out with up to five SNA mainframe hosts simultaneously, at four transmission speeds from 2.4 to 19.2K bps.

Key attraction of the EM 3777 package is that it runs as one job under the COS, Communications Operating System, on the 1600, which means that other binary synchronous RJE protocols such as Hasp multileaving can be used concurrently. Harris says that this facility is not available on the IBM terminals emulated, and should prove attractive to users in process of converting to SNA. As well as Hasp, 2780, 3780, 3741 and 5230 protocols from IBM, the 1600 also supports Univac 1004 and NTR, Control Data 200 UT, Honeywell G115 and 355 and Burroughs DC1100.

The software is offered at no charge to Harris users and runs on the 1610 and 1620 remote batch terminals, which are field-upgradable.

ACT converts shares

THE directors and major shareholders of Applied Computer Technology will soon be receiving a before tax sum of approximately £250,000.

Over three-quarters of the company's shares are owned by the directors, their families and senior executives. Since March 1975 the company has made over £800,000 profit before tax and is forecasting a pre-tax profit of over £360,000 for the next financial year.

ACT is a holding company for six wholly owned subsidiaries whose main activities include bureau services, equipment rental, production and sale of continuous stationery, sale of mini- and microcomputers with associated software; and the sale of software for personal computers.

Group sales have jumped from £643,000 in 1973-74 to £2,114,000 for the year ending March 31, 1978, providing on average a profit on sales of 10%. Some of the accumulated profits were capitalised (converted to ordinary shares) on March 13, 1979 and at the same time the 2,627 £1 shares were subdivided into shares of 10p each. In this way 2,627 £1 shares plus reserves was converted into 2,626,640 shares of 10p each. Of these 10 per cent were offered for sale at 38p a share, but 130p and 140p has already been offered for them.

Banks answer privacy quiz

OVER 300 replies have been received to the Institute of Data Processing Management's questionnaire on privacy, and more are still coming in. Among the respondents so far have been all the major clearing banks, along with many local authorities, government bodies, health authorities, and industrial and commercial firms.

About one-third of the replies have been from non-members of the Institute. An analysis will be carried out, classifying the answers according to type or organisation and also to size. These results will be submitted to the Home Office by the end of April, and then published.

Anyone else wishing to reply should do so as soon as possible. Questionnaire forms can be obtained from the IDPM office on 01-240 3304.

The Home Office will also asking 250 organisations directly for their views on the Data Protection Report. It asks such questions as: Do you support the principle of data protection codes of practice which could not be amended by ministers? Do you think control should be extended to manual systems, or to a narrower category than recommended? What applications should and should not be registered? What are the cost implications?

The Home Office will also welcome submissions from other interested parties. The deadline is the end of April.

Software house loan

A LOAN of £75,000 has been made to software house Micro Focus by the Industrial and Commercial Finance Corporation subsidiary, Technical Development Capital, to fund expansion and future developments.

The money will help the company expand its staffing, which now totals 12 people, so that the full potential of its CIS-Cobol software package can be exploited. Designed specifically for microcomputer systems, CIS-Cobol has already sold heavily in the States, where some 90 per cent of sales have been made. Some of the TDC funds will be used to boost the company's export marketing effort.

In addition to developing CIS-Cobol, which according to director Paul O'Grady still has a lot of growth potential, the money will assist the development of some new products. Several such products are expected this year.

Board for viewdata terminals

A SINGLE board designed to b
the basis of a range of viewdat
terminals has been developed
GEC Hirst Research Centre i
London. Called the Mariposa
board, it is planned for quantit
production at the end of th
year.

The Mariposa terminal ran
will include a home terminal f
under £1,000 in which th
viewdata software is supplied
the form of a plug-in ROM
module.

Two V24 interface sockets w
be provided to enable a print
to be attached or a link to
made to a private viewdata sy
tem.

An expanded version wi
48K bytes of RAM will r
telesoftware to be loaded fr
an in-house system or fro
public viewdata or teletext s
vices. A prototype of this mo
is being prepared for CAP-C
to use in telesoftware trials.

The Mariposa board will
used in the Modular Office S
tem, prototypes of which a
being supplied to the Stock E
change (CW, March 15).

MICRO NEWS MEETS THE INTEL CHAIRMAN . . .

With co-founders Dr Gordon Moore and Dr Andrew Grove, Dr Robert Noyce has taken leading semiconductor company Intel from start-up to $400 million annual sales in ten years. From this position, and having been a founder of Fairchild Semiconductor — the progenitor of most of "Silicon Valley" — he is well qualified to comment on the development of the technology, and the recent upsurge in activity from national governments. In this exclusive interview with Micro News editor Martin Banks, given following his award of the IEE Faraday Medal, Dr Noyce discusses the way ahead for Intel, and the potential threats posed by Japan and, to a lesser extent, the UK.

'Inmos is just a Band-Aid— govt must cure the sore'

Dr Robert Noyce . . . "People in the UK are much too short-sighted."

FEW people are better qualified than Intel's chairman, Robert Noyce, to discuss the development not only within that company, but within the semiconductor industry as a whole. As one member of the triumvirate that has led Intel from start-up in 1968, with some $5 million of venture capital, to a $400 million corporation that is acknowledged market leader in microprocessor manufacture, he is one of the few people with a clear view of the way ahead for everyone associated with the industry.

His views span Intel's own product developments, both current and future, the US business climate, and the recent manoeuvrings of two new competitors for the world's semiconductor markets — the UK and Japan — subjects on which he has strong views.

But even he, and his two co-

'UK govt trying to cure the symptom, not the problem'

founders of Intel, Dr Gordon Moore, president, and Dr Andrew Grove, executive vice-president, could not foretell the impact that some of their product developments were to have. The fact that, as integration levels increase, the semiconductor companies are able to offer more and more to the user as a matter of routine is something they have had difficulty coming to terms with.

The statistics that indicate the current scale of development make interesting reading. According to Dr Noyce, Intel shipped some 200 billion bits of memory last year, and passed the millionth microprocessor figure.

"Micros," he said, "are now finding their way into cars, calculators, medical instrumentation, telephones, educational products — there are thousands of products that can take advantage of the technology.

"Because of this, we must encourage the growth of computer literacy. There is no advantage in becoming modern-day Luddites."

The mention of Luddites was an indirect reference to some of the voices that have been raised in the UK about the potential impact of microelectronics on industry and society. He continued this theme more directly in saying that he found it inconceivable that the country in which the industrial revolution first occurred could consider the development and potential of microelectronics as a bad thing.

He felt that the prime reason for the growth of this negative attitude was the failure of the capital system to build new industries.

"People in the UK seem much more short-sighted," he said. "They are much more interested in achieving immediate better-ment than long-term better-ment" — implying short-term gains are often transient.

"UK people now give the impression that they want to go back to an agrarian society," he said, "without necessarily understanding that they would also lose some great advantages, like modern health care."

But how did he view the recent activities of the UK government in its attempts both to bring greater awareness of microelectronics and to boost semiconductor manufacturing to world market scale? In particular, what were his views on the NEB's potential rival to Intel, Inmos?

"The UK government is trying to cure the symptom rather than get at the cause of the problem," he said.

"Inmos is just a Band-Aid; what the government has to do is cure the sore."

He defined the "sore" as a need to change the investment climate in the UK so that more potentially viable ideas could be realised as new products, and therefore industries.

This was something he also criticised about the US. There is now an increasing lack of venture capital start-ups in the States, due primarily to greater levels of taxation, and inflation. Taxation in particular was a subject he returned to several times, feeling strongly that governments were now penalising investment to the detriment of the long-term future.

"The need now is to tax consumption only, not wealth," he said. "By taxing wealth, you end up trading real estate for capital. Capital gains tax should certainly be abolished." He viewed as a hopeful move the discussions now going on in the US about implementing a value added tax.

The other potential rival to the US dominance of the semiconductor business, one viewed with some concern by Noyce, is Japan. Certainly, in business terms, he feels that the climate for investment is much better in Japan than anywhere else. In addition, the willingness of the Japanese to subsidise targeted industrial sectors if it is in their own interest, increased the threat they offered.

'Need now is to tax consumption only, not wealth'

There is, however, some light in all this potential darkness for the Americans. For a start, as Noyce points out, "in the long run, trade is balanced. The more successful they are, the more the yen goes up in value, until they can't export any more." Also, he suggests that there are growing doubts about the long-term reliability of some Japanese semiconductors. "Though the initial qualification samples are good," he said, "some general product supplies are not so good."

The final doubt about the long-term strength of the Japanese threat stems from their overall push towards a frontal attack on IBM in the computer business. Noyce agrees that this requires strength in depth in software, which he feels the Japanese do not have. "They are not significantly innovative in architecture," he said.

One way this could be overcome is by selling technology to the Japanese, something that Amdahl has done, for example. This he feels is a dangerous move. "Though it has commercial advantages for the first company to do it," he said, "you are basically selling your society's technology."

The technology on which much of this political manoeuvring is based continues to advance at a barely diminished pace. As Noyce points out, in 1960, the level of integration was one transistor per device, while today it stands at 100,000 transistors. The only problem with this is that design times for circuits are now 100,000 times longer.

This rate of development, Noyce feels, has some way to go before the laws of physics call a halt. He feels that the limit will be reached when device geometries reduce to a tenth of current sizes. This still means a factor of 100 improvement in chip densities, which will be used in future both to increase device complexity, and to pack more standard circuits on to a single wafer to increase production capacity.

One thing Noyce is convinced this improvement will not lead to, at least at Intel, is development foretold in a personal view expressed by the company's European director Tom Lawrence, last year (CW, August 24, 1978). He suggests that dynamic reprogrammable architecture might well be a possible route for the future.

Noyce says that this is not a corporate policy, for such an approach means that the device

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. . . AND NOW, THE REST OF THE MICRO NEWS

By Martin Banks

1 Mbit RAM produced on full silicon wafer

IN this third report from the International Solid State Circuits Conference, Micro News looks at two examples of the latest trend in high capacity memory technology — built-in redundant capacity.

THE technology of semiconductor memories was discussed at several sessions at the International Solid State Circuits Conference.

One of the most interesting advancements discussed was a 1 Mbit RAM, produced as a full silicon wafer, having built-in redundant capacity.

Presented as a paper by the NTT Musashino Electrical Communication Laboratory of Tokyo, Japan, the memory uses a three inch wafer and the circuits diffused on to it are organised as 32K words of 40 bits each.

The physical layout on the wafer is as two halves, each half separated into two quadrants. Each of these has 16 fundamental storage units and seven spare units. Each storage unit is organised as 1K word of 20 bits, including 2 spare bits, and is connected to fixed branch bus lines. Data is translated through peripheral circuits consisting of data buffers and branch selectors.

Two 20 bit words are written in or read out simultaneously, one from each half. This operation is performed on either the two left hand or two right hand quadrants, and while it is taking place, the other quadrants are refreshed.

The memory offers considerable redundancy in capacity, and defective storage units can be substituted with the on-board spare units by reference to an external control memory.

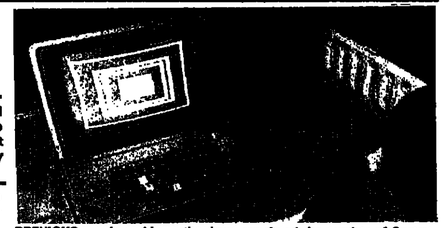
Calculations at the laboratory indicate that, given a not too optimistic yield of storage units of 25% of the total on the wafer, the in-built redundancy increases the memory yield to around 90%.

The possibilities of on-chip storage redundancy are also being explored by Bell Laboratories in Allentown, Pennsylvania. In a paper on a new 64K bit RAM, the problem of manufacturability at high yields was stressed as the main reason for including spare storage capacity.

The Bell Labs' solution is to include the spare capacity on the chip at the processing stage, with access lines to the main store buried in the first layer of silicon.

If, on probe testing, localised defects are found in the main store area, the spare capacity is substituted by using a laser to open the buried lines, and so make the necessary connections.

Though spare capacity increases yields, it is also expensive in terms of silicon. The Bell Labs' chip is over 62,000 square mil in area, a similar figure to IBM's 64K RAM, which has on-board logic-controlled redundancy.



PREVIOUS supply problems that have restricted the number of Compucolor II personal computers (pictured above) coming into this country have now been overcome, according to official importers, Abacus Computers. This means that the £1,390 system should now be available in quantity, for Abacus has obtained a direct claim on a guaranteed percentage of all systems produced.

The above price is for the Model 3 variant, which comes complete with a 13-inch colour display, 72 key keyboard, built-in mini-floppy and 8K bytes of user memory. The operating software is a 16K byte extended disc Basic, held in ROM.

Billion-dollar sales aim

● From page 12

would be an emulator, "and emulators give up a factor of five in performance, which is not the way things are going."

It would also mean relying on other people's software, which is not an Intel strategy. "Ours is to implement high-level languages more economically. Ideally, they should be transportable languages," he said.

Where it might lead is to the 8800, though Noyce refuses to be drawn on details of the device, apart from the fact that it is a genuine type number. He says it is a project looking to what might be done in the future, saying "it will not be a device for years to come."

This is in spite of rumours that such a device is in design and that it might be capable of addressing 10 Mbytes directly.

One area where this improvement will certainly lead is to the 256K bit random access memory, a device to which some Intel sources have attached a 1981 launch date. Given the comment by Gordon Moore at the ISSCC in Philadelphia that design cycles for circuits were now around two years (CW, February 22), it is a reasonable speculation that the design process for this part has already started.

But as Intel market forecasts suggest that the current state-of-the-art memory, the 64K bit RAM, will only just be reaching full production volumes by that time, Noyce feels that 1981 might be a little early to see the introduction of the 256K bit part.

Talk of the 64K RAM leads directly to the speculation that Intel and Mostek are negotiating a cross-licence agreement on their respective versions of the memory, as part of the second source agreement on the 8088, 16-bit microprocessor (CW, November 23, 1978). Such a deal would stem from the fact that two basic versions of the memory are possible, one with a function on pin one and one without. Mostek has opted for the former, Intel for the latter.

Noyce denies that a cross-licence deal is coming, but suggests something that is possibly more significant. Talks are going on between the two companies to standardise the part, though it is not expected that any conclusion will be reached in the immediate future.

If two of the biggest memory manufacturers in the world can agree on a standard device, all other manufacturers will inevitably have to fall into line, unless they can design a significantly "better mouse-trap."

The idea of greater standardisation seems to be a favourite subject for Noyce. Talking about the second source agreement with Siemens on the 8088 (CW, February 22) which he says is still not officially announced, he stresses his views on international collaboration on device standards. "We must do a few microprocessors well," he said, "rather than a lot of them poorly."

In its components operation, the one area outside silicon processing where Intel is now beginning to operate is in bubble memories, according to Noyce.

The first devices from the company set up to exploit the technology, Intel Magnetics, will be introduced during the second half of this year, but he will say nothing of its design or capabilities.

The suggestion around the industry is that it might be a 1 Mbit device, and that it will be introduced as part of a new system. While not denying the possibility of a bubble-utilising system, Noyce states that its introduction will not be concurrent with the memory component.

There are some hints from other sources that the first system to use the memory could be an addition to the Memory Systems division Add-in range of systems.

Managing this technological development, and the company's growth rate, has not been without its problems. For example, Intel has basically withdrawn from the volume market for lower capacity dynamic RAMs because of problems in attempting to step up production at its Oregon facility. This has led to a decision to major on those devices for which there is no practical source, to best utilise available resources.

This resource limitation, even in a company spending $40 million plus on research and development, is also cited as the reason for the apparent about-face on the implementation of Pascal and Cobol software (CW, February 15).

Even so, Intel is often hailed by US stock analysts as one of the best managed semiconductor companies in the world, a fact acknowledged as no mean trick in that high risk business.

It has ridden the four-yearly business cycle of the industry well, and it has not sustained the losses of other companies. The cyclical downturns are worrying to Noyce, however, and he is currently watching all the pointers for the next one, predicted for the end of this year.

Despite this prediction, New York stock analysts Morgan Stanley suggest that the company will top the billion annual sales mark, possibly by 1981, and probably by 1982.

"Our own objective for this figure is 1983," said Noyce, "though we have beaten our own projections before in this area." One reason that the company is displaying this growth, according to Morgan Stanley, is the rise in importance of its systems activities. These currently account for some 34% of Intel's revenue by 1980. "That ratio is predict they will rise to 42% of revenue by 1980. "That ratio is roughly in the ballpark," Noyce said, "though the figures quoted for component sales are conservative. These figures, a $1980 components revenue of $418 million, is conservative by Noyce's estimate, suggest that that the $ billion barrier could be broken even sooner.

READERS REPLY TO RORY JOHNSTON'S ARGUMENTS ON THE PRIVACY ISSUE

Best safeguard for the rights of the individual

I MUST take issue with some of the arguments presented by Rory Johnston both on the Man Alive programme and, in particular, in his article about privacy and data protection (CW, March 8). To suggest that there is no problem that demands legislation as part of its solution is a dangerous position for a computer professional to take. It is, of course, true that unworkable laws are worse than no laws at all, but to suggest that systems may be written that make legislation unworkable will surely have the effect of making any legislation excessively restrictive.

An example is quoted of the relationship between a customer, his bank and their "implied" contract. How is the customer to know what data the bank has on file if he is not able to inspect it (and in some cases, he may not even be aware of the files existence)? Assuming he knows of the file and has verified the data as being correct, how does he know that the "implied" contract has been broken unless he is told what the bank's normal practice on file access is; and who has had access to his file?

The point is also made that an individual has the right to "sit in the privacy of his own home" and record information about another individual on physical or electronic media without violating any moral right of privacy of the latter person. This is all very fine, but unless Mr Johnston his his own personal 370/148 then information thus recorded becomes available to everyone that has legitimate access to that file and possibly to others who gain access. This is the violation of the right of privacy.

The rights of an individual can, I believe, best be safeguarded by enshrining in workable legislation Lindop's principles that data should be known to the subject, accurate, relevant, timely, and complete.

It is hoped that the government will address itself to this before there are so many systems in operation that the problems cannot be solved.

C. J. REASON,
Physicist programmer
Rutherford Laboratory,
Oxford.

Data protection laws: The real threat

Rory Johnston's feature in Computer Weekly of March 8, which prompted the letters on this page.

'Trust us' is not good enough

JOURNALISTS as a rule are a worldly lot, but I was impressed by the degree of naivete shown by Rory Johnston in his article on data protection laws (CW, March 8).

A computer, as manufacturers point out, is more than an electric filing cabinet. Firstly, through technology, the scope for data storage is far greater than ever before. In the past there were simply not the data banks to pose any threat, real or imagined, to our privacy.

Secondly, and more importantly, the computer occupies an elevated position in our world view. If I stated, say, that drinking milk caused cancer, it would be clearly seen to be a personal opinion. That same opinion, coming from a computer, would tend to be believed.

Johnston also shows a touching faith in the legal system. However there is much scope for persecution without prosecution. Police in 10 countries may stop your car because it is "suspected of being involved in a crime". You can be turned down for jobs because your name is on a blacklist. You have not been brought to court nor have you been libelled, but under present law you have no means of ensuring the accuracy of any data held about you.

I believe data protection laws are needed for four reasons: 1, Information held may be untrue; 2, Information may not be secure from unauthorised access; 3, Information may be obtained without the knowledge or consent of the individual; 4, Information may be passed to a third party without the consent of the individual.

The main area of concern are the databanks of bureaucracies and big business. The computer hobbyist has nothing to fear from the "datacop". In fact, enforcement of standards could involve trade unions much as health regulations do now.

Justice must be seen to be done. Computer people must come up with a demonstrable system for protecting the privacy of the individual — merely to say "trust us" is not good enough.

JOHN BAKER
Senior Programmer
Gloucester County Council

Steady move to quasi-police state

RORY JOHNSTON'S article, Data protection laws: The real threat (CW, March 8) is a welcome contribution to the privacy debate. It is unfortunate, however, that the article should concentrate on the more trivial and irrelevant aspects of the debate and virtually ignore whole areas which are the cause of most concern.

Johnston spends much of the article discussing the potential for computer crime by individuals: dishonest programmers, "bent operators", industrial espionage, creeping bank managers, owners of microcomputers, etc. And I agree with him that it would be exceedingly difficult to legislate against actions by such individuals.

But, surely, the major worry that people have about computers and privacy is not with the petty criminal, but rather with the threat posed by centralised government databases and with the slow but steady move towards a quasi-police state. If Johnston truly wishes to encourage a "less alarmist approach to the subject of privacy" then he will surely need to address himself more closely to those matters which are causing the alarm.

He also appears to adopt a rather careless attitude toward police computers when he says that "it still makes no sense to try to control what the police think, rather than what they do." This separation of "thinking" and "doing" is clearly artificial. If Johnston had been a Jew in Hitler's Germany then I believe that he would have been desperately concerned about what the police "thought" (i.e. knew) about him and therefore what they might "do". It is all too easy, speaking from a cosy vantage point in 1979, to say "This does not worry me. . . . the police can suspect me as much as they like ..." etc. But who is to say that this country's political position might be in, say, five or ten years from now and how central personal dossiers might then be used against the interests of the population?

Joseph Goebbels is reputed to have said "He who runs the information runs the show" revealing thereby that although he may have known nothing about computers he knew much about information. I am increasingly convinced therefore that it is the "informed, concerned computer people" (to quote Johnston) who should be the first to spell out the hidden dangers involved in the present trend towards data centralisation. Attempts to "educate" the public away from its current "apprehension of computers and files" would, I feel, be grossly irresponsible.

JOHN WELFORD
Musselburgh
Midlothian

Rory Johnston replies . . .

CONSISTENTLY in the case made for data protection laws, people attack the wrong problem. For instance, if the public believes that information on a computer must be correct (and I don't think many do), then that is the problem we must tackle, by education. It does not make sense to try to make the information perfect by law, because we will not succeed.

If a computer were to express an opinion, I would certainly believe it, because the machine would have to have been brought to life by God. Barring divine intervention, computers do not have opinions. This is the sort of muddled thinking we must fight against.

Similarly, if the police are persecuting people, with or without computers, then that is the problem. The persecution is in their actions, not their files, and accountability to the public for their actions must be adequate. If a police state or dictatorship were established, privacy would be a trivial part of all the other problems we would have. We must concentrate all our efforts on making sure that we do not get a dictatorship in the first place, and not on ensuring that, if one does come, there are fewer computer files for the dictator to use. Hitler, as mentioned in the letters, managed perfectly well without computers. . . .

Far from being a hindrance to a dictatorship, the DPA could be very useful to it. The Authority is intended to be totally independent and incorruptible, but you may be sure that one of the dictator's first orders would be to seize the offices of the DPA, wherein he would find lists of everyone's systems and inspectors on how to inspect them. From the point of view it is far safer for everyone's security independent.

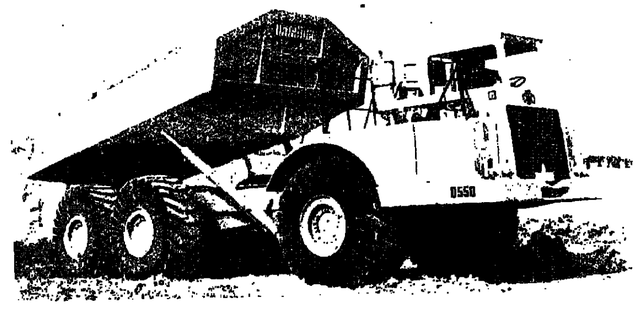
It is absurd to suggest that there is no difference between thinking and doing. If thinking about crime has the same penalty as committing one a large proportion of the population of this country would be in jail.

Many of the problems that are raised in criticism of my views are irrelevant, because they could never be solved by data protection laws. For instance, such laws would not stop your name from being on a blacklist, or on a blacklist consisting of any old piece of paper.

The main difficulty, though, is the failure to define what constitutes the often-mentioned "right of privacy". No two people agree on this because privacy is quite a different thing from freedom of speech or religion. But that would require another article to elucidate.

It is quite untrue that dictators are unaffected by computers. Already in Sweden, you have a home computer and, when you get your Christmas card, its you that Americans are selecting as the ones to have to go to Vietnam. The Tax Inspector would only have to press a button and only people he wanted to persecute would appear.

Transaction processing - a new dimension



As business data processing moves into the 80's the current emphasis is on computing flexibility.

This is being achieved by a fast growing trend towards distributed data processing environments. These allow computer users to place workstations at strategic locations throughout their business and to process several different tasks simultaneously whilst sharing common data.

User Group

Now in its seventh year, Interchange, the User Group of Perkin-Elmer Data Systems in the UK, continues to flourish.

The Group meets quarterly in London for user presentations, Company product announcements and in depth technical presentations. It is run by a committee of users who decide agendas and issue a regular newsletter.

Perkin-Elmer is represented at all meetings by the Chief Executive and the Uk. Support Manager.

This facility is provided by a sophisticated transaction processor linked to an efficient data management system and operating under the supervision of a transparent communications manager.

This trend is being further enhanced by the growing dominance of the minicomputer based upon a combination of increasing capability and decreasing cost.

Perkin-Elmer, with their range of well established business systems providing advanced multiuser, multi-function facilities, are one of the leaders in this data processing revolution.

Perkin-Elmer's transaction processor reacts to the input of data in a way previously only available on large mainframe systems at enormous cost and at a high machine overhead.

In this new environment it is the data which determines the application module required to process the message submitted from a local or remote workstation.

This provides a business with great flexibility in that the response to data entered is directed to the source of that data and the entire system functions as a real-time data bank for the business providing management with critical decision making information instantly. Transaction processing lends itself ideally to the solution of business problems, such as in the distribution industry, where tight inventory control and cash collection must be matched to a fast and efficient order processing function.

The low cost of these Perkin-Elmer systems now brings these benefits within the reach of all companies where traditional methods are stifling growth.

Record Corporate results

Record sales and profits have been reported by the Perkin-Elmer Corporation for both the second quarter and six months periods of its 1979 fiscal year.

Sales for the second quarter ended January 31 were $176,932,000, a 29 percent increase over sales of $329,241,000 in the second quarter a year ago.

Sales for the six months totalled $329,215,000, a 30 percent gain over last year's six months sales of $252,808,000.

Net income for the six months was $21,621,000 and was equivalent to $1.09 per share. This was 69 percent above the net income of $12,794,000, equivalent to 65 cents a share for the first half last year.

Robert H. Sorensen, President and Chief Executive Officer, said that each of the Company's five business units contributed to sales and profit growth with continued strong market demand for its products.

Production Control on-line at DJB

The growth of articulated dump truck manufacturer DJB Engineering Limited has been remarkable. Since May 1973 founder David Brown and his team have built DJB into a company with an annual turnover in excess of £20 million, most of which is from export.

Of course, growth at this stupendous rate has not been achieved painlessly but dogged persistence, marketing flair and attention to tight financial and production control have paid off. These characteristics, severe considerably reinforced by the Company's acquisition of a highly sophisticated computerised information system based on a Perkin-Elmer minicomputer, which provides managers at all levels with day-to-day information vital to the continued success of the business operation.

FUTURE EXPANSION

Design and implementation of the system was entrusted to Tripont Associated Systems Consultants, a systems house selected by DJB from a number of candidates, including several major computer manufacturers. With a brief for a system starting with a modest investment but with full scope for future expansion, Tripont specified twin Perkin-Elmer 7.32 processors with disc store, Video displays, card reader and printer.

DATABASE

What we have, say DP Supervisor K. Comer, is a central database holding details ranging from current account balances to bonused orders, stock items and part-explosion lists.

DJB managers are able to dip into this database at the touch of a button to extract accurate, up-to-the-minute information on which to base decisions. This permits tight control of the whole process from taking the initial order to specifying components, building the truck, delivering it and receiving payment.

Beaver is hard worker

Newly announced Perkin-Elmer Beaver is the first intelligent terminal specifically designed to be incorporated into customised, intelligent workstations. There are three independent hardware modules - CRT display, keyboard and an electronics module which can accommodate one or two optional floppy disc drives. These modules can be placed exactly where they make sense for the application. Beaver comes with a comprehensive package of high-level, field-proven software and dozens of options. The Perkin-Elmer Terminals Operating System (PETOS) creates a friendly environment for the user with communication between operator and system in plain, simple English. A complete package of quantity discounts, service and support is available to OEM's.

HIGH-LEVEL LANGUAGE

For much of this work, the Group has, until recently, been dependent on a 16-bit system installed some ten years ago. All software for this machine was written in a high-level language, BCPL, and was run using interpretative techniques. . . In choosing a replacement, the Group wished to overcome the addressing limitations of the 16-bit system and the speed penalties of interpretation. Future expansion potential was also an important consideration.

WRITABLE CONTROL STORE

With a modest grant for the replacement (less than the cost of the original system), the options were examined. Final choice was for a Perkin-Elmer 8/32 processor with 256 KB of memory, two 67 MB discs, magnetic tape and a fine printer. This configuration more than fully met the requirement within the available budget and the decision was strongly influenced by the Perkin-Elmer Writable Control Store, which is user-microprogrammable. At Oxford, WCS replaced the interpreter and allowed continued use of the existing operating system with dramatic improvement in speed. No additional software was needed.

Since installation in June last year, the system has, to quote Professor Hoare, proved to be "fast and reliable" and, of course, offers scope for the considerable expansion which he envisages in the future.

No language barrier at Oxford

Present and future facilities for research in computer programming at Oxford University have been greatly enhanced by the recent installation of a Perkin-Elmer 8/32 Minicomputer and associated hardware.

The Program Research Group of the Oxford University Computing Laboratory holds a Science Research Council grant in software engineering. Through basic research into the theory of programming languages and methods, a major aim is to reduce the cost of computer programming, to match the reducing cost of hardware, by publishing programs of high quality and general usefulness in such areas as process control, word processing, laboratory automation and data bases for small scale workstation applications and ultimately even personal computing.

Systime subsidiary for South Africa

SYSTIME is expected to announce within the next few weeks the establishment of a subsidiary in South Africa. The subsidiary will probably also market Systime machines through distributors in several other southern African countries such as Rhodesia, Zambia and Tanzania.

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As with other aspects of the computer industry, the OEM peripheral market was significantly impacted by the minicomputer revolution which altered and expanded the character of the devices themselves and the scope of the marketing environment.

At first, minicomputer manufacturers were principally concerned with the development of new technologies in processing power and core memory. Growing out of scientific and process control environments, the mini was integrated with a variety of specialised I/O devices. Therefore the idea of setting up to manufacture and market peripheral equipment was then, for these typically small companies, uneconomic.

Since the OEM market was at that time dominated by large organisations, already equipped to interface and support mixed hardware installations in the mainframe area, it made more sense, from both the mini supplier's and the OEM point of view, to co-operate in making mini technology available to a wider range of end-user applications. Thus the mini gained acceptance in the higher volume commercial sector.

In addition to the absence of standard peripheral devices, the mini approach went away from the conventional idea of making application software available with hardware. Already, software houses were becoming more attractive, since end-users, developing more knowledge, were demanding greater flexibility in applications to meet specific individual requirements.

The software house, as a result, developed special skills in building complete working systems centred on minicomputer technology. This not only added momentum to the mini manufacturer's market, it had an enormous impact on the size and scope of the market for OEM peripherals.

Continuing to supply mainframe OEM products, these manufacturers were now supplying the successful mini companies as well as the many and diverse systems houses. By buying in peripheral products, both had the benefit of favourable terms from the manufacturers, providing the opportunity to add value and acceptance overall to total systems.

As the more successful minicomputer manufacturers expanded their markets, high volume sales potential for relatively simple, conventional I/O devices, particularly in the commercial sector, became apparent. It had become worthwhile for some mini suppliers to go it alone on certain peripheral manufacture. Since rapid expansion trends are destined to continue in the near future, they pose the question as to whether OEMs can continue to compete effectively and perpetuate their market for mixed hardware installations. The answer is yes.

To begin with, it is only the larger and more dominant mini manufacturers at present who have the resources and turnover sufficient to manufacture in the peripheral area. Many others will, for some time, continue to buy on an OEM basis.

Further, for economic reasons, those mini manufacturers who can develop proprietary peripheral products are concentrating on conventional, high turnover devices. So, as yet, they do not compete with the OEM in the demand for high volume, high performance disc drives, magnetic tape transports and printers, nor the lesser, but no less important, need for specialised devices.

Since many OEMs at first developed their expertise in the mainframe environment, they are better equipped to satisfy the mass storage requirement, where such a need is commonplace. As some are large organisations, often involved in mainframe and even mini, manufacture themselves, they have both the experience and the kind of resources — people and finance — needed for R&D into the typically more expensive high-speed, big peripherals technologies and market requirements. As for specialised devices, systems houses need a reliable supply of a wide range of peripheral devices which they can readily adapt and interface to satisfy the demands of individual end-users.

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● Turn to page 19

Series 1 is building block for new systems houses

UPON examination, it is clear that Series 1 architecture has been designed for more complex systems and greater purposes than have been revealed up to the present. Since its introduction two years ago, we have seen a progression of sub-models — A to E — within the Series 1 family, and we expect that IBM will continue to enhance and improve the range through its life. It is estimated that more than 6,000 Series 1s have so far been delivered worldwide.

It is forecast that the rate of installation of Series 1 will accelerate in 1979, and by 1982 more than 100,000 systems will have been delivered since introduction.

Our conclusion was that IBM was not interested in acquiring anything less than a very substantial proportion of the worldwide minicomputer market. It is not difficult to forecast that with the Series 1, IBM could well become one of the world's top three minicomputer suppliers into the 1980s.

In making the decision to offer Series 1 products and services, we placed more emphasis on pricing and performance of the Series 1. Of primary importance is IBM's policy for the Series 1 of separately charging for all hand-holding and support — an unbundled pricing policy. As long as this policy, and attractive financial terms, are continued, it is foreseen that Series 1 sales will maintain their momentum and fast growth.

The Series 1 is a medium scale minicomputer with the processing power comparable with DEC's PDP-11/34 or Data General's Nova 3, and with a very competitive pricing structure. Its overall performance capabilities, as enhanced by the thriving "third party OEM system houses", compare favourably with the IBM System 7 or the IBM System 34. Most tasks within the capability of a System 7, a Series 1 can do better — and for less money. Moreover; everything that the smaller System 3s are capable of performing can be implemented by a less expensive Series 1.

IBM's stiffest competition in the minicomputer arena comes from DEC. However, DEC's most comparable product, the PDP-11/34, is more expensive in single quantities. At the high end the PDP-11/34 is as powerful as the Series 1 but we have only seen the beginning of the Series 1 family. Even Data General with the Nova 3D is finding the Series 1 to be a price competitive system.

It is very difficult for competitors to match the low-entry price or the IBM reputation for reliability and service.

The provision of software, applications packages, and systems management for the Series 1 is proving to be an open and fertile marketplace for the systems houses. Until the introduction of the Series 1, IBM was not a significant factor in the OEM approach to integrating minicomputers, peripherals and software into total systems. The potential of IBM reliability, availability, and service.

Many manufacturers produce a high quality minicomputer, but IBM's has a substantial advantage, says GEOFFREY BROUCHER. He points out that its name is acknowledged to go with the greatest value in the DP world and the highly visible reputation for providing product reliability, availability and service.

The Series 1 was introduced in November, 1976 as a family of small powerful general purpose machines to "put an emphasis on productivity."

Broucher, who is executive director at Gamma Business Machines, has had over 20 years' experience in DP. He argues that the main virtue of the system is its possibilities as a building block.

While IBM issued their own Fortran and PL/1 compilers the systems houses produced and marketed their own versions of Cobol and Basic. While IBM produced system development aids, the Realtime Programming nature of the OEM business was quantity discounts, the unbundled approach by the manufacturers including little support and flexible products. The systems houses produced total solutions and generated substantial add-on value revenues in the process.

Since the introduction of the Series 1 minicomputer and IBM's unbundled marketing policy much has changed for the systems houses which must now consider the powerful sales System (RPS), the Event Driven Executive (EDX) and the Control Program Support (CPS), the systems houses announced commercial applications packages, and multi-tasking, multi-terminal operating systems.

In most cases the software and applications packages produced by the systems house have been created quickly and have matured easily into reliable products for the Series 1 market. The reason for the apparent ease with which these products quickly reached maturity of operation — and documentation — is that they have not been designed and developed from the ground up, but from product already operational within the systems houses on other minicomputers. Examples of this process are the sophisticated multi-tasking multi-terminal operating system, COS/1, featuring an optional ANS-74 Cobol compiler, and the many commercial and manufacturing applications packages available today from the systems houses.

Other software soon to be available from the systems houses includes Series 1 to Series 1 communications facilities, and Series 1 to 370 facilities with 2780/3780 protocols.

Among other Series 1 product opportunities open to the systems houses today for development, are distributed systems and networks, systems replication or propagation for large users, data entry, and emulators. As with other minicomputers, the Series 1 will provide opportunities for systems houses to establish expertise in "vertical market areas".

Perhaps one of the more significant of IBM's aims for the Series 1 is the development of complex networks of distributed systems linked to a 370 hub via channel interfaces. The production of distributed systems to run on Series 1, with the potential ability to communicate with the 370 host, is a software development with a large potential market.

The evaluation of IBM's Series 1 as the potential basic building block for a new systems company produced two deflating conclusions. The first was that IBM's commitment, drive and energy towards the Series 1 and its market were factors impossible to ignore. The second was that it appeared there were deliberate gaps in the Series 1 total product that IBM wished the systems houses to fill, and there would be a substantial market for these products.

In mid 1978 the decision was made to create a new business and Gamma Business Machines was formed. The pattern that IBM was following with the Series 1 had been discerned, and GBM aimed to support the IBM sales team, in the knowledge that it was possible to add significant value to the Series 1 and offer an attractive product.

GBM negotiated a sales agreement with Computdata of the US and is now offering a range of Series 1 well proven commercial applications packages, the COS/1 operating system with ANS-74 Cobol, and systems management experience. Last October this company began trading and their systems are now being installed.


Enticknap

When things are not quite what they seem

By Nicholas Enticknap

SYSTIME was established in 1972 to sell computer systems based on the PDP-11 minicomputer. Over the years it has built up a body of both hardware and software expertise and has, in the process, gradually increased the home-built content of its products. It has also built up its turnover from nothing to over £9 million in the last financial year.

Looking at the Series 1 from this background, Systime's overall reaction is one of disappointment. Managing director John Gow summarises it tactfully: "Perhaps we underestimated just how good DEC actually are." Systime is keen to emphasise that it is not knocking either IBM or the Series 1, and stresses that its views relate to Series 1 as it is now, and not as it will be when the various enhancements currently under development are announced.

Systime has for the time being suspended activity on the Series 1 until these promised modifications have arrived and can be evaluated. The machine sits idle in the company's research and development centre, while, beside it the latest acquisition from DEC, the VAX-11/780, hums lustily away.

That Systime should be interested in the Series 1 at all may come as a surprise to some readers who are aware of the company's hitherto unswerving allegiance to DEC. Gow points out that the company's complete dependence on DEC for processors is not necessarily a good thing. Relations between the two companies are good, but Systime has to face the possibility that DEC might change its policy towards systems houses over a period of time, and this could have damaging repercussions.

Systime is large enough now, with £9 million turnover last year and a projected £15 million or more this year, to diversify its expertise. As Gow says: "There are two companies in the computer business which count, taking the world market as a whole — DEC and IBM. It made sense for us to look at IBM."

Another factor was the "buy IBM" policy adopted by a large number of corporate managements. Systime has experience of being excluded from tenders for this reason, and it seemed sensible to adopt a product which would provide an entry to this valuable market.

Series 1, when announced, seemed tailor-made for Systime's needs. The product was, in Gow's words, "conceptually very good," and IBM was ready to sell the processor alone, without peripherals. This gave Systime the opportunity to add value in the way it has traditionally done with PDP-11 systems, by adding peripherals, interfacing, and commercial data processing software.

Not that the Series 1 was seen simply as an alternative to the PDP-11. Whereas the PDP-11 based systems have been tailored to suit a wide range of commercial DP applications, Systime's plans for the Series 1 were orientated to specific market areas, such as banking and insurance.

When the Series 1 arrived, it soon became apparent that its paper promise was not to be realised. Even opening up the panels on the front was a letdown; the way the electronics had been put together was far below the standard the company was used to. John Gow commented, "It's as if they had designed a glasshouse, and then given the construction job to somebody more familiar with stone castles."

A more fundamental objection is the performance restrictions imposed by the operating system, RPS. R&D software manager Ian McNeill has studied RPS, and feels strongly that the overall design philosophy of the memory management system could be improved.

Just how good is IBM's Series 1? Experience of the system is still very limited and a general consensus of opinion has yet to emerge, argues Nicholas Enticknap.

One company that is in a good position to deliver a verdict is Systime, the Leeds-based systems house, where management and technical staff have been studying the product for the best part of a year.

This is organised in such a way that the overheads greatly inhibit throughput; it also restricts the facility with which two tasks can share common functions. Another restraint which does not yet play a part, but probably will in the future, is the theoretical main memory limit of 512K bytes — this becomes less if any facilities are shared between two partitions.

None of these problems is dictated by the hardware architecture, and none, believes McNeill, is insurmountable. He has in fact developed his own ideas on how they could be rectified.

The issue of memory management prompted Gow to question IBM's decision to build a 16-bit machine in the first place. Surely a 32-bit machine would not have cost any more to design, would have conformed to the general trend, would have averted the need for memory management, and would have allowed a wider scope of applications? That must remain one of the puzzles surrounding an increasingly enigmatic product.

McNeill also criticises the Series 1 for its program preparation facilities, which, he says, did not make full use of RPS, and was slow and laborious to use. It is effectively a batch-oriented design which is very cumbrous in comparison to competitive products.

Systime has also studied another operating system, F.DX (which stands for Event Driven Executive). Developed in California, it is now an official IBM product. McNeill feels however that EDX, while being quite adequate for undemanding systems such as payroll, is simply not powerful enough for Systime's needs. In particular it imposes severe restraints on multiple terminal handling.

IBM's policy is not to disclose its future plans, and John Gow points out that any Systime development of the Series 1 must be in line with the general pattern of IBM development. To ensure this, Systime must be kept informed about IBM's activities. This, says Gow, is a normal aspect of a relationship between a systems house and its CPU supplier.

An obvious inference from Systime's experiences with the Series 1 is that IBM has not yet come to terms with the minicomputer marketplace. Both in its design thinking and its marketing the company is heavily influenced by its experience with large mainframes.

This means that at present companies like Systime are not getting the service from IBM that they have been accustomed to get from established minicomputer manufacturers like DEC. But, Systime feels, there is nothing inherently unsuitable about the Series 1, and the company has been assured that developments to be announced over the course of the next few months will deal with all its criticisms.

Accordingly, Systime has for the time being adopted a policy of wait and see, in the meantime concentrating on other development areas, such as teleprocessing software for its newly-acquired VAX-11/780 (CW, December 21/28, 1978).

Supply and demand

From page 17

The scope of the OEM market is bigger, since it penetrates all levels. Experience gained over many years of OEM user requirements in interfacing and adapting peripherals to meet individual application needs has enabled the OEM to evolve products where interface mechanisms can be simplified. And, where products have been very successful, such as Control Data's storage module drive family of disc products, media and hardware interfaces have been adopted as industry standards.

Vital to the system builder are reliability and continuity of supply, with emphasis on the economic opportunity to expand end-user systems and offer greater choice. So a family of compatible OEM products enables him to cut design and development costs. Large OEMs are in a position to meet this demand. Control Data, for instance, has a family of interface-compatible disc drives which allow growth from 12 Megabytes, to 300 Megabytes, with greater capacity to follow.

From a more general point of view, the argument for continued expansion in the OEM market can be very much simplified. True, competition is increasing. But this only offers greater choice, and subsequent flexibility, and keeps the OEM on his toes. Moreover, the computer market is now so diverse, and so large — and expanding all the time — that it will be a very long time before supply exceeds demand.

Contact Steve Bass market

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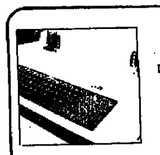

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Microforum Europe '79 to be staged at Wembley in June

MICROFILM equipment of all kinds will be exhibited at Microforum Europe '79 which runs from June 26/29 at the Wembley Conference Centre — the same venue as last year's Microforum show. A one-day seminar conceived as an introduction to micrographics will be repeated on each of the three days of the show and the subjects covered will include 16mm roll systems, microfiche, jacket and aperture card systems, formatting, duplication and computer output microfilm.

In a separate micrographics industry development Bell and Howell has acquired Micromedia Ltd, the micro-publishing and micro-printing company.

Micromedia produced more than six million microfiche and nearly four million feet of microfilm in 1978.

Cado low-cost business systems for UK soon

A FAMILY of low-cost interactive business systems manufactured in the US by Cado Systems Corp of Torrance, California, is to be introduced to the UK in a few weeks by an as yet unnamed distributor. Cado has shipped more than 1,300 systems in the last two years, including 200 to European customers.

Cado claims that its machines perform like an IBM System 34 at an IBM 5110 price. They could also be serious competitors for the lower end Basic/Four and Quantel machines.

To construct its systems Cado buys in VDUs, printers and disc units from OEMs, but builds its own processor boards using the Intel 8080A and 8085 devices.

The firm's most important contribution, however, is the systems software, in particular the disc operating system which is said to provide highly effective file management. Compared with other machines, the Cado systems can store twice as much data on the same amount of disc space, according to the company.

The programming language supported, called Cado, is described as an extended version of Basic. Cado source code modules are compiled by the system into compact macros which are called down from disc and expanded into machine code at run time.

Cado in the US has also developed a group of applications packages for jobs like payroll, general ledger, accounts receivable, purchase order writing and inventory. These can be modified for European users by Holland Computer Systems International of The Hague, which has bought the European rights to the packages from Cado.

The Hague company already works with distributors marketing Cado systems in most other parts of Western Europe.

Cado has also done business in Eastern Europe, and has shipped about 20 systems to the Soviet Union over the last year. The company believes it is the first in the US to ship small commercial systems to the USSR.

One of the systems is used as an RJE terminal with a Rjad ES1022 mainframe at the Russian-owned Elorg computer bureau in Helsinki.

The Russian deal was clinched jointly by Cado's East European distributor and by its European support group, Livia Holdings Inc of Monaco, an independent computer marketing firm which developed Cyrillic keyboards and character generators for the Russian systems.

Cado sells entirely through distributors in both Europe and the US.

The Cado machines being sold in Europe are the System 20/I and the System 20/IV which handle single and multitasking, respectively.

The systems can have up to eight operator stations and disc storage can be expanded from 1.28 Megabytes on diskettes to nearly 80 Megabytes on rigid discs. Systems will soon also be available with up to 60 Megabytes of fixed disc storage.

UK prices will range from about £8,000 for a diskette based system to £25,000 for a multi-terminal hard disc configuration.

Other features include IBM 2780/3780 emulation on both systems and IBM 3270 communication on the 20/IV. The latter can also be supplied with a word processing package integrated with its database software and a user-oriented report generator called Just Ask.

Cado Systems Corp revenues increased from $4 million in its 1977 fiscal year, ended December 31, to $13 million last year, and the company is aiming at $25 to $30 million this year.

Upgrade by user microprogramming

● From page 4

itself to suit the job it is doing.

What does the user gain from user microprogramming? If an overall performance improvement of two times is achieved — a modest goal in user microprogramming — the user has saved himself the cost of another system and saved himself some main store into the bargain.

Some examples of the use of microprogramming and figures for the performance improvements achieved are given in an HP Application Note[1].

The most important requirement over and above an assembly language programming capability and WCS hardware is someone who is sufficiently concerned about system performance to "do something about it".

REFERENCE

1. Application Notes 281-1, Microprogramming — a way to get higher performance from HP1000 computers. Hewlett-Packard document 5953-3070(22), Hewlett-Packard Ltd (CW), King Street Lane, Winnersh, Wokingham, RG11 5AR. Tel: 0734 784774.

COURSES

Crest sets up Pisa workshop

PISA is to be the venue for the Crest course on information systems, organisational choice and social venues, which will be held from April 9-20. The course is sponsored by the Crest-ITG of the EEC, the Italian National Research Council and Pisa University. Candidates may be eligible for a scholarship which covers the registration fee, and applicants can obtain details from Frank Land at the London School of Economics. Tel: 01-405 7686 ext 894.

INTERACTIVE computer graphics is to be the theme of a ten-day course at Leicester University. It will provide theoretical and practical sessions on the storage tube display, refresh display and the raster scan display. Participants will require a working knowledge of Fortran and practical sessions will be on a PDP 11/45 computer. The course will be held on the basis of one day per week for ten weeks commencing April 18. Further information from Mr S. H. Ward, Department of Engineering, University of Leicester, Leicester LE1 7RH. Tel: 0533 50000 ext 56.

USING microprocessor technology, a special seminar to be held by Software Architects, the Zilog course specialists, will take place at the Cafe Royal, London, from March 7-8. The seminar will provide a brief introduction to microprocessing and focus on how micros are already being applied in industry. Further details from Stephen Kirk on 01-734 8402.

THE P-E consulting group will be repeating their course on application and inventory control during the week beginning April 30. The course will be held at the P-E consulting group training centre, Park House, Egham, Surrey. For further information contact David Parker, on 07843 4411.

SUNDERLAND Polytechnic currently operates an HND Computer Studies course, which covers programming, data processing, business organisation and business systems analysis and design. During the second year of the course students are required to obtain full time employment to gain practical experience relevant to the course. For further information contact J. F. Reed, Department of Mathematics and Computer Studies, Sunderland Polytechnic, Prinsman Building, Green Terrace, Sunderland. Tel 0783 76191

THRLATS and opportunities presented to companies by the rapid development of microcomputers will be examined at the third seminar for senior managers. The seminar, organised by the Oxford Centre for Management Studies and Oxford System Associates will take place from May 21-23. Demonstrations will be given by participating companies. Further details can be obtained from Mrs S. F. Beaven, Senior Administrator, Oxford Centre for Management Studies, Kennington Road, Kennington, Oxford OX1 5NY. Tel: 0865 735422.

AN introduction to modern digital systems is a one week course to be held at Leeds University. The course is broad and introductory, and participants can exercise some choice in the nature and level of their activities. Applications should be made to the Director of Special Courses, Department of Adult Education and Extramural Studies, The University, Leeds. The course will be held from April 2-6, and again on September 17-21.

SUCCESSFUL systems design: the human element is the title of a five-day course which is part of the Brunel University management programme. It will be held at the London School of Economics from April 2-6, and will cover such areas as strategies for choosing a system, socio-technical design and personal skills. Numbers will be restricted and details can be obtained from Pamela Pocock on 01-398 1401

SOFTWARE Architects will hold a ten-day course on systems design with microprocessors, at St James Hotel, London from April 23-May 4. The course aims to give grounding in designing and programming microprocessor based systems and practical experience is given on the Z-80 microcomputer system. Details from Software Architects. Tel: 01-734 8402.

MICROPROCESSORS is the subject of a course to be held at Hatfield Polytechnic on ten consecutive Wednesdays starting on April 25 until June 27. Lectures will be given in the afternoons and practical work will occupy the evenings. Details from Mrs P. Ingram, School of Information Sciences, The Hatfield Polytechnic, Hatfield, Herts.

Saving energy by efficient use of air conditioning

By Brian Leaney

The need for year-round air conditioning in the computer room provides a chance to make energy savings very simply. Brian Leaney, managing director of Applied Industrial Refrigeration (Sales) Ltd, explains the rewards and methods available.

THE computer room offers an ideal opportunity for energy savings due to the demand for year-round air conditioning. A great deal of these energy savings can be achieved by very simple means and are applicable to the majority of computer installations.

Computers will operate over a fairly wide range of temperatures, but they do need precision air conditioning to limit the rate of temperature change to a minimum. The normal recommended level of tolerance is 72°F ± 2°F with 50% relative humidity ± 5%.

A mid-range mainframe with storage and input/output devices will have an electrical load of 50 kW, all of which is eventually converted into heat. Add to this the heat gain due to lights, personnel and external summer conditions, which as an average would be 20% of the computer's heat production, and a cooling requirement of 60 kW could be necessary.

The energy requirement of the air conditioning system to remove this heat will be of the order of 30 kW based on a yearly average, or over 250,000 kW/hrs per year, which at 2p per kW/hr is over £5,000 a year. At 10% escalation this operating cost would be in excess of £8,000 a year in five years.

Before investigating the possible savings from the mechanical air conditioning system, the owner should take advice from the engineer regarding thermal insulation, double glazing, etc to minimise the effect of external weather conditions, but a more important task is to ensure that the room is adequately vapour sealed.

A room which is not vapour tight puts severe demands on the humidification system, and as well as expending unnecessary energy, this maximises the possibility of a costly breakdown.

Having ensured that the computer is housed in the best possible building "envelope", the owner should think about the environmental conditions at which he wishes his room to operate. A change in room dry bulb temperature from the recommended 72°F up to 75°F has a minimal saving in energy of approximately 2%, whereas a change in operating relative humidity level from the normal 50% RH to 48% can save between 12% and 15% of the total energy usage, and decreasing to 46% RH can save 20% energy costs — well worth considering.

Before accepting this lower operating level for relative humidity the owner must check with the engineer to ensure that the humidity controls are sufficiently accurate to keep within the computer manufacturer's specified limits.

Having looked at savings that can be achieved without reference to air conditioning equipment, the owner should now look for the most energy efficient equipment and, if necessary, seek advice from a reputable engineer. An "in room" packaged air conditioning unit is cheaper to operate than a central plant air conditioning system, where high horse-power fans have to move large quantities of air through the building. The packaged unit or multiples of packages move the same amount of air, but over a localised area, therefore using less fan power. The packaged unit is normally developed by manufacturers specifically for computer applications and therefore is tried and tested, and has balanced components to suit this need.

The most efficient air conditioning system utilises direct expansion cooling with air-cooled condensers, but site conditions and size of room must be taken into account before the final decision is made.

Probably the most important component of the air conditioning system is the compressor, and it is here that a major energy saving can be made by using semi-hermetic or serviceable hermetic compressors as opposed to the fully hermetic type. The semi-hermetic compressor, as well as being more reliable, also uses between 12% and 20% less energy.

Another form of energy conservation is utilisation of the heat absorbed by the air conditioning system for heating of adjacent areas, or other heating processes. Taking our computer system of 60 kW cooling requirement together with the heat input from the compressor, a heating capacity of the order of 80 kW is available.

This 80 kW will be available in the form of hot water at a temperature of about 110°F, which is too low for conventional heating methods. It will, therefore, be necessary for an engineer to design a system to utilise this otherwise wasted heat. This waste heat recovery is certainly worth considering when looked at from an economic standpoint, as from a 30 kW energy supply an achievement of 60 kW cooling capacity and 80 kW heating capacity is possible.

Waste heat recovery is a method of utilising energy already used. Recent research in the US has developed a unit that will cut running costs dramatically during intermediate and winter seasons. The system employs a closed circuit ethylene glycol condensing medium which is cooled by outside air, pumped through a pre-cooling coil in the packaged unit whenever the glycol is below room temperature. For 18% of the year, with ambient temperatures above 61°F (18°C), the system operates normally without pre-cooling available. For 10% of the year, with ambient temperatures below 35°F (2°C), the pre-cooling coil eliminates compressor operation. For the remaining 72% of the year, the system operates with partial pre-cooling and limited compressor operation. These systems have operated successfully in the US for two years and even with the comparatively mild winters of Britain, running cost savings of 20% are envisaged when compared with the most efficient conventional system.

The last, and probably the most important, aspect of energy saving is to ensure that the equipment is maintained in tip-top condition throughout its working life. A well maintained unit will repay maintenance costs many times over, not only by reducing running costs, but also by increasing reliability.

CJ spreads the word . . .

THE first television advertisements for a word processor are going out on London Weekend Television for AES Wordplex. Spots lasting 45 seconds are being transmitted in late evening prime time during news and current affairs programmes, aimed at executives of small businesses. AES Wordplex does not say how much the campaign is costing, but around £70,000 has probably been spent so far.

The advertisement stars John Barron, "CJ" in the TV comedy series, The Fall and Rise of Reginald Perrin. He plays an executive who wants a letter corrected in a hurry. A split-screen comparison is shown between a typewriter and an AES Plus screen word processor.

The company says it is pleased with the response so far. If this continues, the same advertisement will be shown on other regions of ITV. Making the film probably cost about £20,000, and each prime-time showing another £4,500.

Ignorance of micros

● From front page

the MAP scheme, the Minister said that so far 200 feasibility studies had been approved, out of nearly 300 applications vetted by Warren Spring Laboratory. The cost of the projects ranged from £17,000 to £3 million. The first project to get the go-ahead is to be announced in two or three months.

Asked to comment on the Minister's criticism of industry's lack of initiative in the application of micros, a spokesman for the Confederation of British Industry said Williams had been using "flowery language". He was unable to give any examples of companies developing products incorporating micros, but added, he did not "have the authority to release any names".

He said that the CBI was not carrying out any studies of the use of micros but added that a report had been submitted to the ACARD committee. Details of this, he said, were not for publication.

'Unions must change'

● From front page

They must also rid themselves of the blind fear that technological change means their own downfall.

That is his personal view.

The report which covers the US, the UK, France and West Germany, says that in 1987, the microelectronics market in just four sectors — automotive, consumer, business communications and industrial — will stand at $30 billion. Consumers in these locations will possess 400 million intelligent electronic modules (product units), typical products being the "add-on" variety.

Sponsored by over 80 clients including the National Enterprise Board and the Department of Industry, the report is available at a cost of $35,000. Tel: 01-493 8801 for further details.

Goodbye to all that Victorian furniture

Terminal stations are essential for those regularly using VDUs. The Facit workstation permits easy adjustment of both screen and keyboard by means of gas infilled leg supports.

OFFICE computers are as aesthetically satisfying as the average refrigerator, and the furniture that goes with DP equipment is often equally unlovely.

Perhaps this is because the science is in its infancy: alternatively this unlovelyness may be explained by the innate dreariness of functional office designs, which have tended to be less imaginative than design for leisure.

We have one consolation amid all this bleak design, which is that much of today's computer furniture will fade when the dimensions and housing of the computers themselves evolve, and much of the antiquated storage paraphernalia — racks, trolleys and the like will also go on the scrap heap with the "steam" mainframes.

Meanwhile we must learn to live with these curios — IBM Flame Red, Honeywell Light Beige, and all. Essentially computer furniture falls into two categories; the furniture for the computer itself and that used by the people who serve the beast.

The computer furniture includes all the boxes, racks, shelves, trolleys and safes needed to house the system's storage and output, and although these accessories directly involve the human interface, one cannot place them in the same category as the "people" furniture.

It seems strange that the computer, which was designed by Man to serve his needs, is often considered to be of greater value than Man himself.

Yet how often has one seen an operator handling a valuable computer system while seated on a chair that would be rejected by a cat? Worse still, this perversity of human values has come to be accepted by us all.

The problem of chairs is quite serious. While the BCS and the government rack their brains about the problems of standards and security and other newsworthy topics, operators and programmers the length and breadth of the country are frequently falling off their chairs.

This may sound frivolous but it is a real problem, and the consequences can be quite unfunny.

Most office swivel chairs consist of a padded adjustable seat with a moveable back support, with or without arms, housed on a single pedestal base which is seated on a four-strut ground support.

Yet in West Germany, government legislation has banned these chairs incorporating four-strut supports because of their infamous tendency to tip over. The only safe chair of this type is one with a five-strut support.

Legislation is currently being introduced in a number of other European countries to rectify this problem, except in the UK, where, it would seem, nobody cares if the entire office and DP workforce falls sideways in one fell swoop.

One of the leading UK manufacturers of computer furniture, Data Efficiency of Hemel Hempstead, has gone to some pains in its product catalogue to point out that its chair features the necessary five point safety base.

Like most of DE's furniture, the chair is safe and reliable. DE's furniture does not exhibit the elegance of its Scandanavian or Italian equivalents but is well priced and useful.

The company, which has staged a dramatic expansion in a short time, runs a highly efficient computer based telephone ordering system which provides high speed stock replacement and claims quick delivery.

Its furniture range covers everything from special desks built to house packaged minicomputers to its own products featured in its catalogue. These vary from operators' coats and lockers to furniture and binders for print-out.

In the same league as DE are Willis Computer Supplies and PCA Data Processing Accessories, with a number of others that include Sankey Sheldon, Shannon Datastor, Gave and Tab, Carter Parratt and Twinlock.

Not all these organisations mentioned include as full a range of DP furniture as does DE, but most of them supply printout and magnetic tape storage racks, and filing cabinets in a range of materials, colours, types and prices. Some of them also supply swivel chairs with four-strut bases — so beware.

Today the latest word in office and DP furniture design is "ergonomic" and certainly effective working design is something we all need.

Truly ergonomically designed DP furniture is not usually found amongst the product ranges of most of the UK accessory suppliers, who tend to specialise in low cost simple solutions to problems, a situation resulting more from user demand than anything.

Indeed, many managers would not care a jot about the daily struggles of their operators who may regularly attempt to move heavy VDUs away from direct light or reflected glare from windows.

The solution to this well known problem is simple, a terminal table or workstation can easily adjust the position of the VDU without any undue physical strain.

Unfortunately such units, particularly the ergonomically designed terminal tables, have tended to cost in excess of £100 and the best are often as much as £300.

The lack of interest in this country in ergonomic office and DP furniture has resulted in the emergence of only a handful of overseas suppliers in this market.

Although these and other suppliers may have encouraged difficulties in the past with managements resenting expenditure on staff oriented furniture, recently the pattern has changed.

No doubt the example set by "people" oriented companies with offices in this country, of which IBM is an example, has become too much for UK managers, who are taking a greater interest in this type of equipment.

The most noticeable companies in the field of ergonomic furniture in this country are Flambo Fortschritt, the joint German/ French concern to West German manufacturer Gutmann, represented in the UK by Data Automation; and Facit, the Swedish furniture manufacturer. All three supply ergonomically designed furniture, including adjustable terminal workstations for use with VDUs.

Facit has tended to produce good yet costly furniture, but has recently brought down the cost of its terminal work stations most significantly.

This has been due to an increased demand for terminal work stations in Sweden, which resulted in high volume production of these units.

Thus a gas infilled VDU supporting terminal station which used to cost £250 is now available for £91.

Gutmann's commitment to the DP market is total. It supplies desk housings for a large range of manufacturers varying from IBM to Phillips and Wang.

It manufactures both OEM specials like DE as well as a large quantity of modular desks and units, including shelves, filing cabinets and chairs.

Design styles are smart, clean and clinical, and somewhat reminiscent of Swedish designed furniture.

Flambo Fortschritt is more of an office furniture supplier that has moved into the area of DP accessories. The company recently announced a new range of ergonomic furniture including a VDU terminal workstation.

Acoustic screening is a problem that frequently deserves greater attention in the DP environment, and nearly all the suppliers mentioned offer this useful accessory.

Yet few managers appreciate the problems of noise created by printers and other semi-mechanical equipment, and in many environments where it seems essential it has not even been considered for installation.

The problem of computer furniture is overall a human problem. If companies could only recall exactly why they installed these machines in the first place, and look at the nightmare of mis-use rooms and offices in a new light.

There is some consolation among the "Victorian" furniture that most people in DP have to contend with: it is on its way out.

ANTHEA BALLAM takes a peek into the near future and concludes that the problem of computer furniture is a human one. She urges users to look at their requirements in this light.

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OUTSTANDING OPPORTUNITY IN NORTH LONDON . . .

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A famous name furniture manufacturing company (part of a large, successful Group), can now offer two new opportunities to join their small, highly professional D.P. team in North London.

The Installation, upgrading from an ICL 2903 to a 2904, offers the chance to develop your existing skills in COBOL as well as gaining valuable new expertise, including some RPG and plenty of on-line experience.

Programmer to £6000

On Offer, in addition to the above average salaries, there are excellent benefits (including **discounts on furniture,** subs. canteen etc. etc.); the offices are easily accessible by rail, car or bus from most of N. London, Herts. and Essex.

If you've got 2 years' + experience (4 years' + for the senior position), ring Penni at SBS on 01-734 0582 (24 hr.) for more details.

SBS RECRUITMENT SCIENTIFIC & BUSINESS SYSTEMS LTD 29-31 OXFORD STREET, LONDON W1R 1RE

Systems Engineers Programmers

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Southern California

Our client, a major American industrial concern with unusually deep capabilities in advanced technology, manufacturing and international marketing, operates one of the largest commercial data networks through a division with headquarters in a most attractive location in Southern California.

This network, widely respected for its technical superiority, features the most advanced equipment and techniques. The teleprocessing system – one of the largest in use in the private sector – is supported by IBM 3033 and Amdahl 470V6 using a broad range of minicomputers for front-end processing.

Rapid growth has created a number of attractive openings for highly qualified professionals in several disciplines including:

* **Application programming**
* **Database management systems**
* **Communication engineering**
* **MVS operating systems**
* **Telecommunication networking**

Of particular interest are candidates who have extensive experience in developing complex application programmes in large scale on-line IBM environments using ALC as well as those with broad minicomputer programming in ALC. Candidates should have HNC or B.Sc. qualifications and at least 3 years' directly relevant experience.

London interviews will be arranged soon. Relocation and immigration assistance will be provided.

Applications will be treated IN STRICT CONFIDENCE throughout by us and our California associates. Please send full c.v., with home phone number quoting ref 1204/CW/2 to Philip Smith:

Philip Smith
Manpower Consultants
85-87 Jermyn Street, London SW1Y 6JD

R.P.G. II PROGRAMMER

Applications are invited from Programmers with a minimum of 18 months' experience of RPGII (preferably ICL).

The successful candidate should be in their early 20s and be able to work with minimum supervision.

Salary will depend upon experience and qualifications.

For an application form apply to:

The Company Secretary
Johnston Administration Limited
Johnston House, Hatchlands Road
Redhill, Surrey RH1 1BG

YORKSHIRE REGIONAL HEALTH AUTHORITY
Intermediate Systems Designer

Scale 9 — £4,959-£6,025

Two vacancies for Intermediate Systems Designers have arisen at the Authority's Computer Centre in Harrogate for the Applications Development Teams.

Computing in the region is currently on ICL 1904A Hardware using George 3 and active consideration is being given to the replacement of this machine with an ICL 2900 in 1981.

The successful candidate will have 2-3 years' practical experience of systems work and the ability to supervise other staff.

Interested applicants can obtain further information from Mr. J. Dale, Regional Computer Services Officer (0423) 62441.

Job description and application form available from Regional Personnel Officer, Yorkshire Regional Health Authority, Park Parade, Harrogate HG1 5AH, quoting reference No. 80.

Closing date 6th April, 1979.

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01-405-8546

MYRIAD

PROGRAMMER ANALYST

To Move to New IBM 4331

SOUTH BUCKS Up to £7500

Our Client the U.K. division of an international pharmaceutical group has recently ordered the new IBM 4331 as the upgrade for their System 3 and an attractive opportunity has now arisen for a progressively minded programmer analyst to lead the conversion development effort for the present systems and thence to become a key figure in new systems development for the installation.

With batch and extensive on-line systems as well as telecommunications and internationally linked timesharing facilities, the position will afford a great variety of commercial systems involvement.

The successful candidate will be able to offer either a comprehensive commercial background of RPGII or strong programming experience under 370 DOS/VS and they will be given the opportunity to develop their knowledge of the new range 4331 with formal training.

The company is located in very attractive rural surroundings and, in addition to the usual company benefits, can offer flexitime and a free private patients' plan.

Ref. NW1/2203

SYSTEMS ANALYST

Near WATERLOO

£6500 - £7500

This position presents an outstanding opportunity for an Analyst with at least two years' experience now seeking a more challenging and rewarding career within one of the most progressive installations in London.

Joining a highly professional, project oriented department, the successful candidate will initially be involved with the design and specification of major developments to the Group Personnel System. As one of the country's leading organisations the central management services department are anxious to develop sophisticated reporting and analysis systems to assist in the management of its 22 thousand employees. This appointment is therefore regarded as critical to ensure the Group's market lead and record of successful industrial relations is maintained.

Candidates should have a sound business awareness and be keen to take responsibility for total project development within a company able to offer excellent prospects for a varied, progressive and highly rewarding career.

The company's installation houses three large central mainframes and has an extensive communications network. An excellent commencing salary is enhanced by a range of large company fringe benefits.

Ref. SE1/2203

COULD YOU BECOME A PDP SPECIALIST?

Basingstoke To £6000

As U.K. market leader in its field, our client is certainly in a strong position from which to expand. In line with this, the data processing department has recently been enhanced by the addition of a DEC PDP11/34 and they are now seeking a dynamic and enthusiastic person to become involved with the development of new systems, then provide software and applications support to users.

The person appointed will be involved in a highly time critical environment at the hub of the company's data processing activities. He/she will therefore need a sound background in the use of mini-computer systems and DEC PDP11 in particular. Principal areas of activity include PL/1 applications and software diagnostics.

As an autonomous member of an international group of companies the organisation is able to offer excellent conditions of employment including flextime, four weeks' holiday, and a subsidised restaurant, as well as exceptional opportunities for career progression within the group.

Ref. SW2/2203

PROGRAMMERS

C. LONDON To £6250

Approximately two years' COBOL gained on any machine could enable you to accelerate your career within one of the most advanced installations in the country.

Offering:

* ★ Excellent formal training in advanced software.
* ★ Outstanding career development leading to analysis.
* ★ Excellent starting salary and conditions of employment.
* ★ Total job satisfaction.

Our client offers a first-class career to programmers as members of a professional systems and programming team currently working on a variety of applications to meet the business requirements well into the 1980's.

Ref. SE2/2203

MYRIAD APPOINTMENTS LIMITED
30 Fleet Street London EC4Y 1AA
01-353 0981

We're successful because our staff are

Data Logic operates at the forefront of computing, applying the very latest hardware and techniques to practical commercial problems. We cover the range from mainframes to the smallest computers. We are leaders in the use of microprocessors for applications that not so long ago required far larger machines. Several of our projects involve dispersed networks of ten or more minicomputers.

The exceptional scope of work is important to our staff. We can match their individual experience to their projects. Equally, we can ensure that each project adds to their experience. As computing itself develops, so do they.

Over the past year Data Logic has grown dramatically in size, in scope of work and in reputation. Our expansion has meant unrivalled opportunities for career progression. We are not prepared to promote people before they are ready for it. But when they are ready — and we give all the assistance we can — the positions as senior programmer, senior analyst, project manager and consultant will be there waiting for them.

The reason is simple. We know that we are successful only if our staff are.

Senior Software Staff

(Ref PS/01)

For mainframe, minicomputer and mixed processor systems, usually supporting terminal networks. Increasingly Data Logic's turnkey projects involve minicomputers at multiple sites.

Applicants must have at least five years experience including some work in consultancy, system design or team management. Substantial knowledge is required of either high level language implementation on a leading mainframe or assembler language development on DEC, Data General or other leading minicomputers. We are especially interested in experience of:

- database systems
- distributed systems
- data communications
- telemetry
- operating systems design and implementation

Salaries will be up to £8,500, with a car allowance or company car for those at the top end of the scale.

There are vacancies at our Greenford, Birmingham and Manchester offices.

Programmers

(Ref PS/02)

For both mainframe and minicomputer projects which include commercial applications, monitoring and control, and scientific analysis.

Applicants should have at least three years programming and/or analysis experience in high-level language or assembler on any leading mainframe or mini. Salaries will be in the range of £4,500 to £6,500.

Vacancies exist in our Greenford, Birmingham and Manchester offices.

Data Communications Support Engineers

(Ref CP/01)

For sales and engineering support roles within Communications Products Division which markets the INTERTEL range of modems and Network Control Systems.

Applicants should have experience either in sales support for data equipment or in design for digital and analogue systems. A degree or HNC qualification is desirable.

Base location will be in Central London but high mobility will be essential and a car will be provided. Salaries will be in the region of £6,500.

Systems Support Staff

(Ref CE/4)

For specialist support roles within our Customer Engineering Division, which provides nationwide field service for terminal and distributed systems, word processors and data communications equipment. The support staff deal with hardware and software, within a diversity of user environments. Each product represents the state-of-the-art in its area.

Applicants should have a degree in electronic engineering or computing science, followed by at least three years work in specialist support with a mainframe manufacturer.

Base location will be Harlow, Essex but high mobility is essential and a car will be provided.

Programmers

(Ref TS/03)

To work on systems software, emulators and advanced packages for applications such as data entry, for Data Logic's PTS100 range of terminal and distributed systems. This is an outstanding opportunity to gain experience in the development of complex high performance standard software.

Programmers will work in small teams, taking considerable responsibility for distinct functional areas of the total system.

Applicants should have one to three years experience of software implementation in high-level or assembler languages. A degree in computing science is desirable.

Location will be Harlow, Essex and salaries will be in the range of £4,500 to £6,500.

Data Logic

Write or call, quoting the appropriate reference:
Kathy Martin, Data Logic Limited, 29 Marylebone Road, London NW1. Telephone 01-486 7288.

A Raytheon Company

Open Evening Camberley 29th March

Words can only convey part of Data Logic's unique atmosphere. Meeting us will tell you far more. Come and discuss the opportunities we have for you at our open evening at Frimley Hall Hotel, Camberley, Surrey on 29th March. We'll be there from 5 pm to 9 pm. There will be drinks and light refreshments and the sessions will be informal.

JBA

MIDDLE-EAST PROJECTS
Initial appointments in London

The Middle-East Operation, now established as a rapidly expanding division within a major consultancy, is attracting a growing range of technically advanced systems development projects as a direct result of a successful marketing policy in a number of Middle-Eastern countries. Many of these projects involve on-line systems and are usually controlled by in-house teams from their inception through to implementation - often including hardware selection.

Staff requirements for the group currently fall within the following two categories:-

Systems Designers — £7,500 - £9,000

Several years design and implementation experience is essential, preferably preceded by a sound programming background. Knowledge and demonstrable experience of on-line commercial systems is also a prerequisite.

Programmers — £5,500 - £7,000

A minimum of three years programming experience is required, encompassing development work for on-line systems. Candidates with either large ICL 2900 or PDP 11 minicomputer experience are especially welcome. Appointees will spend an initial period in the company's London office before being sent out on assignment, and applicants must be able and willing to spend both short and long periods outside the UK. These appointments present a unique opportunity to join a progressive and highly successful organisation.

Very substantial remuneration packages apply to on-site projects in the Middle East. **Contact: Margaret Stevens**

Electronics Technician

Middlesex — up to £5,500

Our client, a well known terminal manufacturer, is expanding its headquarters services and therefore has a vacancy for a Technician to diagnose and repair equipment and PCBs.

Applicants should have an HNC in electrical or electronic engineering (or similar) and at least one year's practical experience in a workshop or repair environment. This is a tremendous opportunity for a young person wanting to start in the computer industry. **Contact: Jim Baker**

Sales Executive

London Based — c £13,000 + car

Having established an enviable reputation for the quality and efficiency of its software packages in the United States over the past ten years, this company's venture into the U.K. market has proved to be astoundingly successful.

To further expand and consolidate this relatively new venture, room has been made for an additional Sales Executive to join the London team. The appointee will be able to rely on high-level technical expertise as support back-up, but candidates will ideally have had systems/project management experience prior to entering the sales field.

Career prospects are superb - the company's next step will be into Europe, so Sales and Branch Management positions will be available.

Contact: Andy Wright

Systems Analysts

Covent Garden — to £8,000 + Bonus

Our client is a major oil-drilling services company, with over 3,000 field technicians operating in 55 countries worldwide and an annual turnover which is increasing by 25%+ per year.

Analysts with a sound business systems background are required to join a small team, with an IBM 370/125 under DOS/VS - due for upgrading in the near future - and a T.P. link to Paris, which is about to embark on developing a completely new range of Financial Systems. Each analyst has complete project responsibility from feasability through to implementation.

All usual big company benefits apply - a superb bonus scheme, plus non-contributory pension scheme. **Contact: Andy Wright**

(Junior) Systems Programmer

Surrey — £6,000 - £7,700

This organisation now have their IBM 3032 installed and running under VS1 with plans to introduce MVS within one year. This presents an ideal opportunity for a systems programmer, with around two years good IBM experience, to move onto the latest range of equipment and obtain valuable further training.

Applicants should be familiar with performance orientated products and have a good understanding of SYSGEN and operating systems. The successful candidate will enjoy an environment of self-defined job responsibility and every encouragement to progress in their career.

Convenient location. Realistic salary, and excellent fringe benefits.

Contact: Mike Creamer

For further information on any of the above vacancies please contact the appropriate consultant.
If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES, International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

GERMANY

Hardware and Software Engineers

Modular Computer Services is one of Europe's leading manufacturers of mini computer systems, particularly in the areas of industrial process control and communications.

Expansion of our GERMAN market has given rise to requirements for two Field Service Engineers. One will work from our STUTTGART office and the other in HANNOVER. Candidates should have a background of testing/maintaining mainframe or mini computer systems, with the ability to fault find down to chip level.

We also need a Post-sales software analyst to work from the HILDEN office. Candidates should be experienced in troubleshooting on operating systems and systems software, preferably in a real-time or communications environment.

These positions will be attractive to someone who is mobile, single, German speaking and keen to spend two years in Germany.

Benefits will include a competitive salary, company car and a relocation allowance. For application form contact ANNE CAMPBELL on 0734 788711 or send details to MODCOMP, Molly Millars Lane, Wokingham, Berkshire.

+MODCOMP

Data Communications

ADVANCED NETWORK EQUIPMENT SALES EXECUTIVE seeks outstanding long-term relationship. I have faultless communications, wonderfully integrated design and unrivalled control features. I will provide possible five figure income and car. Write or call.

INTERTEL communications equipment is probably the most advanced available anywhere for modems, and network control. An integrated range of devices, meets user needs from small single computer terminal systems to large complex networks with many distributed processors. No other products offer such powerful diagnostic and control facilities from a single site.

INTERTEL equipment is marketed in the UK by Data Logic's Communications Products Division. User reaction is enthusiastic and sales are rising fast. This is why we need experienced and energetic Sales Executives to develop the market further. Candidates should have experience of selling or supporting the sales of relevant data communications or terminal products. They must be knowledgeable about the rapidly changing field of data communications, highly self-sufficient, and mobile.

We offer an excellent basic salary together with commission which should take annual earnings to over £12,000. A car and competitive benefits will be provided.

Write or telephone, quoting reference CP/02: *Kathy Martin, Data Logic Limited, 29 Marylebone Road, London NW1. Tel: 01-486 7288.*

Data Logic

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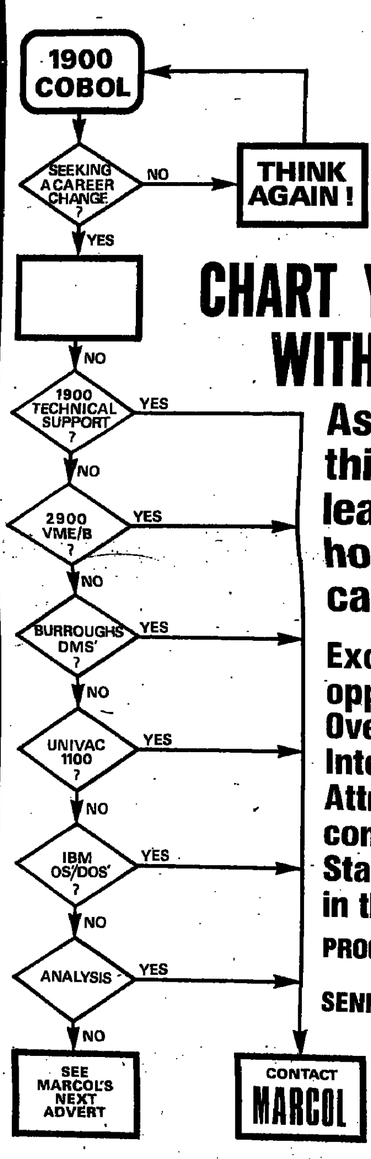
1900 COBOL PROGRAMMERS

WHERE DO YOU GO FROM HERE?



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Starting salaries in the ranges

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For further information contact: Derek Ashley or Penny Bailey

MARCOL Group

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MYRIAD

1900 OPERATIONS SUPPORT MIGRATE TO 2960

S.W. LONDON **To £5000 + Standby Allowance**

As a major international organisation with interests throughout Europe and Africa this company is a well-established ICL user. They have recently undertaken a major upgrade and migrated from twin 1900 processors to a dual 3Mb 2960 configuration making this probably one of the most sophisticated ICL sites in London.

The company is now able to offer a number of outstanding career opportunities to experienced 1900 GEORGE II operations staff who wish to join a progressive organisation. Candidates **must** be able to offer sound knowledge of GEORGE II or II+ JCL, utilities, program libraries and macros. In return the company will provide full training in VME/B SCL and all aspects of 2960, to enable the Operations Support Team to implement and support production systems and offer a comprehensive consultancy service to the operations and data control departments.

Prospects for future career progression are excellent within a dynamic and sophisticated installation.

Ref. SW1/2203

MYRIAD APPOINTMENTS LIMITED
30 Fleet Street London EC4Y 1AA
01-353 0981 (24 HOURS)

BELGIUM GERMANY

to £16,000 p.a.

We are an established systems house specialising in the real time application of mini computers to process control, communications and terminal based systems. Our European operation has built up an excellent reputation for high quality work which has led to an increasing demand for its services.

As such we are looking for analyst/programmers to join our permanent staff for work on a variety of interesting and demanding projects.

The computers we are working on include
DEC Honeywell Ferranti Data General
TI AEG Siemens Motorola Intel

Among the many benefits you will have working for an English company in Europe are:
Profit sharing
Travel allowance or company car
Attractive holiday arrangements
Free language tuition
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You will also enjoy a choice of good living accommodation with minimal commuting, and the advantage of excellent connections to the rest of Europe for travel and recreation purposes.

Additionally, we have vacancies in our London and Manchester offices.

Please reply to:
Roy Stedman, DAI GmbH, Herzogstrasse 61, 6078 Neu Isenburg, (nr. Frankfurt). Tel: 06102-38386
Mrs. C. Ewing, DAI Ltd., Axtell House, 24 Warwick Street, London W1R 5RB. Tel: 01-734 6486 (3 lines)

DAI

Programmers

Salary £3,500-£6,000 *N. London*

ITT Business Systems are a supplier of communications systems for a wide range of customers throughout the U.K., Europe and many other parts of the world.

If you have been a programmer for at least 1 year and have experience in one or more of the following areas:
—minicomputers
—microcomputers
—assembler language programming
—real time programming
—message switching
—communications systems
then we would like to discuss with you the job opportunities at the Data Systems Division in Cockfosters.

We are a highly professional organisation employing the latest Software Engineering techniques and currently require programmers to work on a variety of projects, writing in Assembler and ITT's high level language ESPL1. Our software development is performed using the large mainframe facilities of an IBM 3031 and 370/158, while product testing is performed on job hardware giving our programmers 'hands on' testing facilities.

As we are part of the large multi-national ITT organisation we can offer exceptional career opportunities both within the Division and within ITT as a whole.

To find out more please contact Frances Mason, Personnel Officer, ITT Business Systems, Diversey House, 1A Chalk Lane, Cockfosters Road, Barnet. Tel: 01-440 4141.

ITT Business Systems ITT

Systems Analysts £6,500+

New 2960 Installation

Immediate vacancies in Bedfordshire in a stimulating and innovative environment.

Generous relocation assistance and non-contributory pension scheme.

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ALL AREAS
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The best CHOICE of Computer Appointments
CHOICE 129 Cannon St. London EC4 Tel. 01-626 0171

£4000 - £7000+
North+Midlands
Analysts & Programmers
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FINAL PART OF 4

FOR PREVIOUS PARTS — SEE THIS PUBLICATION DATED 15/2 (PART 1), 1/3 (PART 2), 15/3 (PART 3)

★ ★ ★ ★ ★

This is your **last** chance in our client's current campaign for more staff. Due to expansion about 20 **additional** computer professionals are required, and, whilst a good proportion are now filled or on offer, vacancies still exist at all levels through to Senior Programmer. The number required will be exceeded for people of the right calibre.
The work is mostly Development with responsibility according to experience, and excellent prospects to build a solid career with one of the top companies in the North West.

REQUIRED

Cobol experience, coupled with the ability to work for a software house.

★ ★ ★ ★ ★

REWARDS

Plenty of opportunity to learn new skills. Variety of work with job satisfaction. Salaries in the following ranges.

JUNIOR PROGRAMMERS £3,555-£4,475
PROGRAMMERS £4,000-£5,197
PROGRAMMER/ANALYSTS £4,786-£6,136
SENIOR PROGRAMMERS £5,242-£6,743

IMMEDIATE INTERVIEWS ARRANGED

by contacting Dave Hadley at the above address or phone number

APPLY NOW !

OCC

Specialists since 1971 in UK and International computer appointments. We have many other jobs on our files and offer a career counselling service to computer professionals.

London

Software Sales **c £11,000 p.a. (100% targets)**

Software products and services on mini and micro computers is a high volume growth market that can give rich rewards to the ambitious salesperson. A major UK Software House in West London need an experienced consultant to sell:—

- Applications packages on ICL hardware. You will be selling total software and hardware solutions direct to end users in medium and high volume markets.
- Software Consultancy on mini and micro computers. This market is getting a massive promotion from Government Aid and Press publicity. You will be selling for one of the leading suppliers of these services in the London area.
- Turnkey projects. You will be selling tailored business systems, either as a single installation for an independent company or for multiple sites in a larger industrial or financial group. These projects can generate much follow-on business given regular sales attention.

Candidates may have been selling a service, including a package, with an application orientation toward the user market. Alternatively they may have gained marketing experience in a technical consultancy role with a large user, a consultancy or a computer manufacturer.

Please contact Renée Nute on 01-242 9356 (day) or 01-874 6372 (evening and weekends) or write to the address below sending a c.v. or to request an application form. Ref: 505/CW.

OCC Computer Personnel Limited,
16 Bedford Row,
London WC1R 4EB.
Telephone: 01-242 9356

Member of Computing Services Association

The Polytechnic of North London

Faculty of Science and Technology
Department of Mathematics

LECTURER II IN COMPUTING

To teach computing on degree and diploma courses in Mathematics, Computing and Statistics areas including post-graduate courses. Should be willing to develop expertise in the microprocessor systems and software field. Applicants must have a good honours degree or post-graduate qualification including a substantial element of computer science, or possess an MBCS by examination. The Polytechnic has a DEC KL1091 computer system with a multi-access and batch processing service. The Department has a Hewlett Packard 200E mini-computer with interactive graphics and a range of microprocessing equipment.

Salary Scale (inclusive on London Allowance).
Lecturer II: £4676-£7032.
(Staff at the top of the Lecturer II scale can expect progression to the Senior Lecturer Scale subject to satisfying an efficiency requirement.)
Application form and further particulars can be obtained from the Establishment Officer, The Polytechnic of North London, Holloway Road N7 8DB.
Closing date for applications: 12th April 1979.

SURREY — HANTS SUSSEX!

SURREY	Senior Salesman (Media)	£15,000 package + Car
SURREY	Systems Consultant (IBM Exp.)	c£7,000 +
HANTS	Analyst/Progs (RPG II or Cobol)	to £9,000
HANTS	Systems Programmer (IBM Exp.)	c£7,000
SUSSEX	Senior Analyst	£5,750-£7,000
SUSSEX	Programmer	£5,500 +
SURREY	Analyst/Prog.	c£6,500

SDS WILL SAVE beyond the scientific market! Telephoning today! For an early interview

Management Personnel
2 Tunsgate Guildford Surrey
GUILDFORD (0483) 68568

SYSTEMS DEVELOPMENT ENGINEER

MERSEYSIDE
£8,000 circa

Our client is a successful company and a brand leader in the design, manufacture and marketing of consumer durables.

They can now offer a challenging career opportunity to an experienced systems analyst who will play a leading role in the development and application of computer based total systems for control and information purposes.

Although based on Merseyside, you will conduct investigations into management problems in multi-site locations on Merseyside and in the Midlands, working closely with all levels of management to provide effective solutions.

The ideal candidate will be a career minded analyst, 28-32 with an engineering background and qualified to HNC standard. In addition we expect 3/4 years experience as programmer/analyst working with on-line computer systems, preferably using IBM equipment.

General conditions of employment are good with excellent career prospects for the individual who can make a real contribution.

Please send comprehensive career details or telephone for an application form to:

Bryan Greenwood,
JOHN DALTON PARTNERSHIP LIMITED,
58 Hoghton Street,
Southport. PR9 0PG
Telephone Southport 0704 38778

THE DALTON PARTNERSHIP
Management Selection & Recruitment Consultants

OCC

Specialists since 1971 in the UK and International computer appointments.
We have many other jobs on our files and offer a career counselling service to computer professionals.

Hampshire to c£7,000 + Benefits

Attractive Opportunities for Senior Programmers

If you are looking for an opportunity to realise your full potential whilst broadening your skills in a challenging environment then our client, Powell Duffryn Computer Services has a great deal to offer.

- Mainframes, minis and micros
- BASIC+, COBOL, DIBOL, ASSEMBLER
- Interactive program development
- Opportunities for user contact
- Wide variety of on-line database applications
- Rapidly expanding environment

Opportunities exist both in the teams supporting the diverse Powell Duffryn Group (c. £350 million turnover) and the teams created to sell turnkey systems, applications software and bureau services in the general computer service market.

Operating from a new £1½ million centre in Basingstoke Powell Duffryn Computer Services can offer the latest in computer technology plus a modern working environment. The current requirement is for programmers with a minimum of two years experience able to offer experience in one of the languages which are used and capable of making a sound project contribution including supervision and the completion of programs and specifications within timescale and budget. Where necessary training will be provided in developing programs using interactive facilities on mainframes, minis and micros and in the design of on-line systems.

Powell Duffryn Computer Services recognise the importance of people in achieving their substantial plans for growth. Career prospects are exceptional with many senior programming posts plus ample opportunity to transfer to systems.

An attractive initial salary is supported by a car allowance, and a removal allowance where necessary. Salaries are reviewed twice a year and are based on achievement.

To apply, please write or phone, either PD Computer Services or OCC.

PD Computer Services,
Faraday Road,
Daneshill West Estate,
Basingstoke,
Hants.
(0256) 51821
Ask for John Bonner

OCC Computer Personnel Ltd.,
16, Bedford Row,
London, WC1R 4EB
01 242 9356
Ask for Neville John

EUROPEAN CONTRACTS

★ REAL-TIME PROGRAMMERS
★ SYSTEMS ENGINEERS AND ANALYSTS
★ A.T.E. PROGRAMMERS

BELGIUM RATE per hour

1. **ASSEMBLER PROGRAMMERS** Debug R/T Software. Shift allowance £11+
2. **SYSTEMS ANALYST** Telecommunications R/T Systems and Assembler/BASIC £12+
3. **SYSTEMS ENGINEER** Microprocessors Intel 8085 + Assembler £12+
4. **A.T.E. PROGRAMMERS** SENTRY VII. LSI Devices £11+

WEST GERMANY

1. **SYSTEMS ENGINEER** R/T Systems HP21, RTE, DOS + Assembler/BASIC £12+
2. **ATLAS TEST PROGRAMMERS** £11+

U.K. CONTRACTS

A.T.E. PROGRAMMERS Gen. Rad, Membrain, ATLAS, etc.

REAL-TIME PROGRAMMERS CORAL, Assembler, etc.

For further details, please write or phone:

PRIMAT CONSULTANTS LTD.
79 St. Martin's Lane, London WC2N 4AA
Telephone: 01-836 9841

PRIMAT GROUP
Primat Personnel Services
A division of Primat Engineering Co. Ltd

TRAINEE SYSTEMS ANALYST
£2656-£5073 p.a. inc supplement
Post Ref. 2B121/CW

Applications are invited from experienced programmers and others, including graduates in appropriate subjects, for the above post which may be redesignated as an analyst/programmer. The successful candidate will initially be involved in conversion from our 192K ICL 1904A to a large Honeywell 66DPS 100 due in April 1979. The section has over 30 development staff in small teams and provides a comprehensive range of services including mainframe networks, several minis and micros. Starting salary by negotiation according to age and experience, city centre location.

PROGRAMMER (Temporary)
£3732-£4146 p.a. inc supplement
Post Ref 2B119/A/CW

Applications are invited from experienced Cobol Programmers ideally with experience under George 3 or CCCS. The post is temporary covering maternity leave but there may be an opportunity to join the permanent staff. Starting salary by negotiation, city centre location.

The above posts are open to both men and women. Applications are available from the Principal Staffing and Training Officer, Directorate of Finance, Britannia House, Hall Ings, Bradford BD1 1HX, or ring Bradford 29577, Ext. 7704.

City of Bradford Metropolitan Council

Tired of reading hundreds of pages of 'Old Hat' jobs.

To Recruitment Consultants, some jobs just stick out to us as among the best, and this is exactly what we think or rather know about these.

An American Company marketing computer equipment who have established operations in this country and Europe over the past few years wish to recruit two additional individuals, in line with 33% growth plan, for key positions within their organisation.

IBM Software Support Engineer

This job involves responsibility for monitoring the support of existing products and the successful introduction of selected new products into a Large European Distributor network.

The main responsibility lies with software products which interface into IBM Systems. The initial products include IBM 3275 and 3270 Emulators, and a direct mainframe interface.

On a broader scale, the post calls for Professional abilities to maintain an active interface between the technical management in the distributor network and the US based equipment suppliers.

Analyst/Programmer

A rare and stimulating position for an Analyst/Programmer with several years' experience of high level programming on small business machines.

Due to an increasing volume of business, our client wishes to appoint an Analyst/Programmer to take responsibility for the software support of the in-house computer system.

This involves the complete design, development, documentation and implementation of future in-house applications software. In addition to maintaining the latest software for in-house computer systems the successful candidate will be expected to use his specialist knowledge to assist the Product Support Group evaluating new software products.

Based on the west side of London, conditions of employment are very good and include a salary circa £8,000 plus car for the senior position, while the Analyst Programmer will be expected to earn up to £7,000 plus car.

Candidates interested in finding out a lot more about this company and the positions available are invited to contact the advising consultant for DETAILED JOB SPECIFICATIONS and discussions if desired without commitment.

OCC

Central Computing Consultants

KINGSTON: 44 Wood Street, Kingston upon Thames, Surrey, England. Telephone 01-549 3212 Telex 27950
DUBLIN: Canberra House, 24 Lower Leeson Street, Dublin 2. Telephone 789577 (5 Lines)

Licensed annually by the Dept of Employment No SE(B) 170

Programmer

c£5,600 p.a.

Rank Film Laboratories require a Fortran programmer with at least one year's experience, preferably on Data General equipment, to join a small research group whose task is to improve the technical operating efficiency of the company.

The work will centre on the development and maintenance of real time Nova systems concerned with the monitoring and control of film equipment and processes. Experience in the programming of Hewlett Packard 9810/9815 calculators, 8-bit microprocessors and ICL 2903 equipment would be an advantage.

Applications should be addressed to the Personnel Manager, Rank Film Laboratories, North Orbital Road, Denham, Uxbridge, Middlesex. Telephone: Denham 2323.

RANK FILM LABORATORIES

The Tower Hamlets Health District
THE LONDON HOSPITAL (WHITECHAPEL)

COMPUTER OPERATORS

Operators are required to participate in the efficient operation of Univac Mainframes. Current applications include real-time patient management, resource allocation, radiology and clinical pathology services. Operators will carry a large measure of responsibility and will be heavily involved in user support, liaison and general troubleshooting.

Salary for Basic Operators — £4301 p.a. rising by 5 annual increments to £4964. Intermediate Operators — £4936 p.a. rising by 7 yearly increments to £6237. Both grades are inclusive of shift allowance and enhanced payments for weekend duties.

For further details, 'phone Sylvia Lyons or Les King, up to 8.00 p.m. each evening, or write with brief career details to: Modem Computer Services Limited, FREEPOST, London WC2N 5BR. 01-839 3351.

Freelance Contracts MODEM Permanent Positions
Consultants in Data Processing

U.S.A.

$18,000-$27,000

We are urgently looking for experienced analysts and programmers to fulfill contracts in the mid-west area of the U.S.A. Our main requirements are for personnel with IBM mainframe experience preferably with one or more of the following:—
OS, CICS, IMS, 3790, PL1
Preliminary interviews are to be conducted within the next two weeks with a view to meeting the American clients visiting London and Birmingham in the first week of April.

For further details ring Keith Phillips at:

Project Recruitment Limited
D.P. and Computer Staff Recruitment

Ring House, Suite House, Holloway Circus, Birmingham 1. Tel: 021-643 8118/9

CLASSIFIED COPY

All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring David Abbey for further details on 01-261 8018.

Euro-Calc Ltd

MICRO-COMPUTER SERVICE ENGINEER
Salary to £6,500 p.a. + car

Euro-Calc Ltd. are expanding micro-computer retail group require an Engineer to set up a service facility for their London based operation.

Tel. 01-405 3223

CAPITAL APPTS. 29 Windmill St. London W1.
FORTRAN
Programmers urgently required for industrial and Scientific Development. £5,000-£6,000+. All Areas.
Phone for the list of vacancies.
637 5557 day, 636 9659 eve.

Cobol Programmers
Urgently required for immediate contracts in East Anglia. H66 experience preferred, but IBM/ICL acceptable.
SIB Contracts
P.O. Box No. 13, Sudbury, Suffolk. CO10 0JY
tel: 0787 73202

REGIONAL SALES MANAGER - LONDON

INTELLIGENT TERMINALS — DISTRIBUTED PROCESSING

INCOME c£20,000

This large European manufacturer of Terminal/Business systems is currently undergoing a major expansion programme due to the immense success of its products during 1978.

The current product range has earned much praise throughout the industry, and new products about to be launched will further enhance the Company's reputation for technical excellence.

The appointment of the London Regional Sales Manager is extremely important to our client's growth, and will offer a genuinely exciting and challenging career opportunity. The position reports to the Divisional Director, and will carry cost-centre and Man Management responsibilities.

Interested candidates must be dedicated sales professionals who by virtue of a successful track record have 'grown' into a management position, and now need to increase their experience in a more senior function.

The successful candidate will be managing an already successful team of experienced account managers and he should have the personality and presence to gain their respect quickly.

This outstanding opportunity will appeal to candidates with drive and ambition, aged between 28 and 38 who thrive on success.

Our clients will offer the successful applicant an excellent remuneration package with a basic salary of c. £11,000 p.a., negotiable guarantee c. £14,000, plus a conservative estimate of earnings of around £20,000 p.a. Other benefits include a Company Car.

For an informal and discreet discussion, please telephone the Account Director, quoting Reference DVW/79/5.

MAJOR ACCOUNT SALESMEN

LONDON AND HOME COUNTIES — c. £15,000 p.a.

This position calls for exceptional salesmen who will 'see' this positin as the forerunner to a career in Sales Management.

Working on large accounts only, successful candidates will be selling a flexible and powerful range of intelligent Terminals/Business Systems, with a bias towards distributed processing, to the end user.

A commercial awareness is essential with the ability to negotiate high value contracts at 'board level.'

The income package will include a basic salary of between £6.5K and £8K, plus a guarantee negotiable to £10K. Total remuneration is c.£15,000, plus a Company Car and other benefits.

For further information regarding these outstanding opportunities, please telephone or write to the Account Director quoting Ref. No. DVW/79/6.

INSIGHT MARKETING & PERSONNEL CONSULTANTS LTD.
72-75 MARYLEBONE HIGH STREET
LONDON W1M 4AJ Tel: 486 5644

The Specialists in Computer Engineering Opportunities of **ALL** Disciplines

Training in

CALIFORNIA

SALES EXECUTIVES c£16,000

Choice of 2 litre car — Basic c.£7,500 — Guarantees — Excellent benefits.

UNIQUE PRODUCT RANGE PRE/POST SALES SUPPORT c£8,000

Choice of car. Excellent fringe benefits

Our clients are the U.K. division of an extremely successful U.S.A. computer manufacturer. Their product is unique in that it can be operated from individual work stations in a 'multi-function' role. The company is a pioneer in distributed processing, in the true sense of the phrase, supported by powerful software enabling the product to be configured in any combination of the following:

- ★ Data Entry Systems
- ★ Programmable Display Systems
- ★ Stand-alone Multi-user Computer Systems
- ★ Distributed Processing Networks
- ★ Word Processing Systems
- ★ Programme Work Stations

The U.K. division has been remarkably successful in just two years, establishing an enviable reputation for technical excellence and product/client support.

We consider the potential of this company to be vast, and will undoubtedly offer candidates the opportunity of establishing superb career prospects in the short term. Income levels are amongst the best in the industry, and Fringe Benefits include:

- ★ Choice of Company Car
- ★ Private Patients Plan
- ★ 4 x Earning Life Insurance
- ★ Excellent Pension Scheme
- ★ Regular Training in California

Our clients requirements are as follows:

SALES EXECUTIVES

with a proven track record in the sales of any of the following:

- ★ Mini Computers
- ★ Distributed Processing
- ★ Word Processing
- ★ Communications
- ★ Intelligent Terminals

This exceptional career opportunity offers relevant candidates an exciting and varied career working closely with our clients, customers and the sales force. Candidates will find the work demanding, but very interesting; "JOB" satisfaction figures high up on the list of benefits.

Applicants must understand IBM systems and terminology, especially teleprocessing. A knowledge of IBM assembler or Cobol would be an advantage.

In return a salary of c.£8,000 will be offered, plus a choice of company car, training in CALIFORNIA and the aforementioned benefits package.

For an informal and discreet discussion, please telephone the Advising Consultant, quoting reference no. DVW/79/7. (Sales Executives) DVW/79/8 /Pre/Post Sales Support).

INSIGHT MARKETING & PERSONNEL CONSULTANTS LTD.
72-75 MARYLEBONE HIGH STREET
LONDON W1M 4AJ Tel: 486 5644

The Specialists in Computer Engineering Opportunities of **ALL** Disciplines

OPERATIONS CONTROL MANAGER

C £7500

Major Group Company In Central London

If you're currently working in a fairly senior capacity in Operation Control (e.g. in a supervisory or managerial position), this new vacancy which has arisen at a major national brewery could represent an outstanding career opportunity for you.

The Operations Control Manager's duties will include: direct responsibility for Data Control, Data Preparation, scheduling of the departmental workload, work progression and despatch, and Media Library (an establishment of 25 people). The establishment of a sound and congenial working relationship with user departments is essential.

This vacancy represents an exceptional opportunity. We are looking for sound professional D.P. experience and ability in man management, with the accent on initiative and potential. In return, the job offers a high level of responsibility and an unparalleled structure for further management promotion within the Group, with an excellent salary and substantial company benefits

Ring Penni at SBS on 01-734 0562 (24-hour). She'll tell you more about the Company, the job itself and your prospects with the Group, or write with a brief C.V. to the address below:

SBS RECRUITMENT 29-31 OXFORD STREET, LONDON W1R 1RE

SBS RECRUITMENT SCIENTIFIC & BUSINESS SYSTEMS LTD. **29-31 OXFORD STREET, LONDON W1R 1RE**

MULTIBUS

BUSINESS SYSTEMS FOR BUSINESS

Our user base is expanding rapidly due to the proven track record of our Company in the commercial mini-computer market. Increased sales create more job opportunities

MULTIBUS technology is being developed for the 80's and is fully funded. We belong to a major British group of public companies with interests in leisure, shipping, property, publishing etc., which affords our employees and customer base a secure future. We currently operate out of offices - London, Rickmansworth, Rugby, Woking and Brighton. Locations in other areas of the UK are being established to service the user base.

If you have accounting experience and wish to get into one of the fastest developing fields of business, contact us. The following posts are guidelines, if you believe you have a contribution to make please write to us enclosing a copy of your C.V.

Career and promotion prospects are excellent.

WE NEED

1 **Pre-Sales Analysts**
Responsible for system investigation and design and project management. Should be experienced Commercial Analysts or Commercial Analyst/Programmers on mini-computer systems.
Salary from £6,000

2 **Post - Sales Support Personnel**
Responsible for assisting new and existing customers to implement computer systems, including operator training, software upgrading etc. Should have some Commercial and Accounting knowledge and enjoy dealing with people at all levels.
Salary from £4,000

3 **Applications Programmers**
Responsible to the Head of Applications Programming for the organisation and support of program packages. Will also assist in implementation. Should have 6 months programming experience and be prepared to travel in the UK.
Training in SIMPLE programming language will be given.
Salary from £4,500

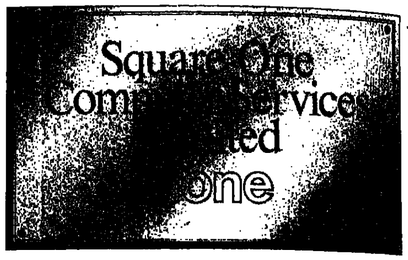
4 **Training**
A person with training experience, preferably in programming on mini-computers to instruct in-house, user and software house personnel in MULTIBUS software and applications programming.
Salary from £5,000

We are always interested in talking to successful salesmen who wish to increase the weight of their P45.

ALLIED BUSINESS SYSTEMS LIMITED

MULTIBUS

Head Office: MULTIBUS HOUSE, STATION APPROACH, WOKING, SURREY, GU22 7UZ. Telephone: WOKING (04862) 70516



Success on a plate

Programmers and Analyst Programmers for MINI Turnkey Systems
£5000-£7750 + Travel expenses + Profit Share

Ideally you should have 2 to 3 years sound Commercial Programming experience in either Cobol or Basic with knowledge of either Hewlett Packard or Data General hardware.

Square One offers high earnings, a friendly working environment and the opportunity to work on a wide variety of applications.

If you want to know more about a successful career with Square One phone Barbara Hawkins on Chesham (02405) 75231 or write to her at: The Limes, 130 High Street, Chesham, Buckinghamshire HP5 1EF

one

OCC *Specialists since 1971 in UK and International computer appointments. We have many other jobs on our files and offer a career counselling service to computer professionals*

Communications Software

£5,000 – £10,000

London

Our Client, a leading international software house, is recruiting several specialists with experience in communications or basic software.

They are currently working on a variety of projects including distributed computer networks, message switching, railway signalling, software for television presentation, packet switching, telex software and systems software. These have been designed by and are currently being implemented within the communications group.

If you have been working in any of these areas and feel you would like to expand your experience in a professional and rewarding company, please ring the number below for a brief discussion. Daytime 01-242 9356. Evenings and weekends East Grinstead (0342) 22270.

Alternatively, write for an application form to Clive Wright quoting reference 486/CW.

OCC Computer Personnel Limited,
16 Bedford Row,
London WC1R 4EB.
Telephone 01-242 9356

Member of Computing Services Association

SENIOR PROGRAMMER

C. LONDON

4 years' 1900 COBOL. Knowledge of Driver/TPS. Supervisory experience.

Can earn up to **£6,800**

TEAM LEADERS

GREATER LONDON

to £8,500

Proven supervisory experience with a strong commercial programming background. Some systems experience would be desirable.

ANALYST PROGRAMMER

C. LONDON

to £6,200

2 years' programming + 1 year's design on 1900s.

To write detailed specs.

MUMPS

Analysts and Programmers

Europe

£13,000 to £16,000

Engineering environment

MINI COMPUTER EXPERIENCE ASSEMBLER PROGRAMMERS

EUROPE

£13,000 - £15,000

Scientific environment communications experience preferred

PROGRAMMER

to £5,750

W. LONDON

2 years 1900 Cobol using GII or GIII.

Excellent development prospects

THESE ARE JUST SOME OF THE OPPORTUNITIES THAT MARCOL CAN OFFER

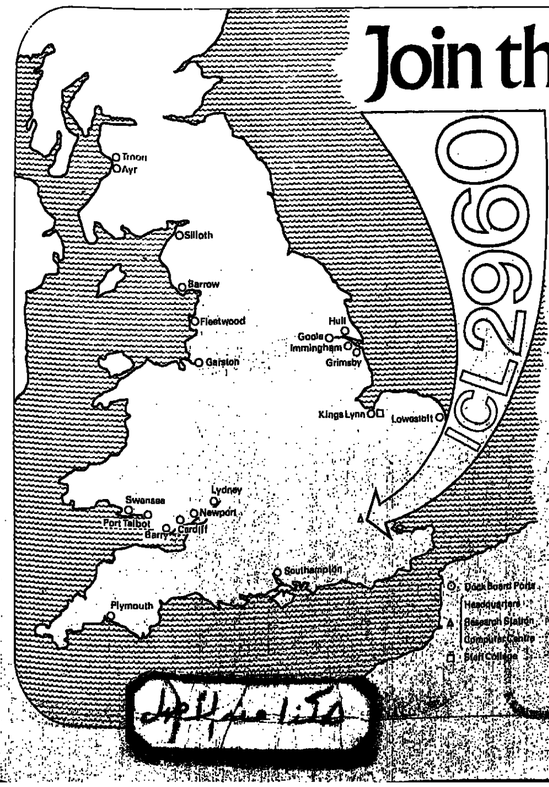
Interested?

Contact: DEREK ASHLEY or PENNY BAILEY **01-402 9355**

Total capability from the MARCOL Group

80 Queens Gardens, London W2 3AF. Tel. 01-402 9355 (24 hours)

Join the Board



If you're bored join a Board where you won't be bored!

Towards the end of 1979 British Transport Docks Board will be installing an ICL 2960 to replace its ICL System 4-50 computer. The 2960 system will have DMS and VME/B software and MAC on-line program development facilities. Redifon and MDS equipment has recently been installed at the Computer Centre and at a number of the Board's 19 Ports to provide data entry, local processing and communications facilities. To assist with the installation and exploitation of these new facilities, the Board now wishes to recruit the following staff male or female; to join the professional and enthusiastic management team at its Computer Centre near Hayes in Middlesex.

Systems Manager
(£6225 – £7364 including outer London Allowance)

The Systems Manager will
– Manage a team of up to 8 Systems Analysts and Programmers
– Advise the Board's Management on various aspects of data processing
– Initiate new projects and improved procedures and techniques
– Be responsible for all stages of computer system development from feasibility study to implementation
and
– Enjoy the challenge of varied and demanding work

Chief Programmer
(£5629 – £6537 including outer London Allowance)

The Chief Programmer will
– Evaluate and advise on software products
– Control the development and implementation of general software facilities
– Develop programming standards and techniques
– Co-ordinate the training of programming staff
and
– Have the drive and ability to become the installation's technical expert

Both salary ranges will be reviewed on 1st June 1979.
The benefits package associated with these two key posts include 40p per day Luncheon Voucher, contributory pension scheme and thirty-two days leave per annum including Bank Holidays. If you wish to apply for either of these two posts, please telephone Tim Bevers on 01-573 5045 between 9.00 a.m. and 7.00 p.m. on weekdays.
Alternatively, you may write enclosing brief details of previous experience, etc. to: British Transport Docks Board, Computer Centre, Hayes Road, Southall, Middlesex UB2 5NE.

British Transport Docks Board

SALES SUPPORT

ANALYSTS

Visit Europe and the USA

The newly announced Cyber 203, the world's fastest Supercomputer, is a positive statement of CONTROL DATA's dominance in the field of large-scale computers and its commitment to on-going product development.

CONTROL DATA is seeking ANALYSTS with significant experience of large-scale computers to provide technical support related to the configuration and sales of Cyber 170 and 203 series computers.

DIRECT EXPERIENCE OF SALES SUPPORT AND CONTROL DATA EQUIPMENT IS NOT ESSENTIAL.

Job responsibilities will primarily involve the design of cost-effective solutions to client problems, keeping in touch with competitive products, contributing to the preparation of sales proposals plus co-ordinating and occasionally visiting the company's technical and marketing operations in Europe and the USA.

We are seeking applicants with direct experience of large-scale computers, involving systems and/or applications software, within either a supplier or end-user environment who are seeking a flexible management philosophy in which to utilise their individual skills and creativity.

Comprehensive training will be provided, probably in the USA, and opportunities for career advancement are considerable.

Job opportunities exist in

Manchester and Central London

and successful applicants can expect to earn an income in the range

£6,500 to £8,000 p.a.

(+ £500 London Allowance)

Please apply to Elizabeth Attewell quoting reference no. EDS 039
SMR Technical Support People Ltd.,
Victory House, 99 Regent Street,
London W1R 7HB
Telephone: 01-734 9776

CONTROL DATA
MORE THAN A COMPUTER COMPANY

Magnetic Media Manufacturing Division

UWIST
University of Wales

INFORMATION OFFICER
DEPARTMENT OF COMPUTING

To co-ordinate the provision of documentation for computer users and to organise and assist with the department's programme of courses.

Applicants must have a degree and several years' experience of using computers in an academic and/or scientific environment.

Grade 1A £3883-£6555.

Requests (quoting Ref. CW) for details and application forms to Personnel Section (Academic), UWIST, Cardiff CF1 3NU.

Closing date: 12th April, 1979.

UNIVERSITY OF STRATHCLYDE

Applications are invited for a COMPUTING OFFICER IN THE COMPUTER CENTRE.
Applicants will normally have a University degree or equivalent qualification.

The successful candidate will be concerned with the maintenance and development of the operating system on one or more of the University's central computers but opportunities will be offered to develop interests in other areas e.g. communications. Central computers comprise an ICL1904S (GEORGE 3), a Honeywell H6080 (GCOS) and a CTL front end processor. The University has installed a comprehensive campus communications system and the Universities of Strathclyde, Edinburgh and Glasgow are linked by 50Kb communications lines with node processors at each site. The high speed network gives access to ICL2980 and 2976 systems at Edinburgh and Glasgow and IBM systems at Newcastle.

Appointment will be on Grade IA of the national salary scale for university related staff. Salary scale £3883-£6555 per annum (under review) with placing according to qualifications and experience. Superannuation benefits.

Application forms and further particulars (quoting 16/79) and enclosing a self-addressed envelope (9"x4"), may be obtained from the Academic Appointments Officer, University of Strathclyde, Royal College Building, 204 George Street, Glasgow G1 1XW with whom applications should be lodged by 5th April, 1979.

Info-centre with data bank needs

TEAM-MEMBER

with tech., computer skills, work on Latin America. Economist pref., £3500. C.v., details:

CALA
1 Cambridge Terr., NW1
487 8277, by 15.4.79

OPERATORS

IBM OS £5000
Company in rural Essex are currently looking for an Operator with 18 months' to 2 years' exp. of OS/VSI.

IBM OS £4500
Leading Oil Company in Central London currently working a 2 shift system are looking for an Operator with a minimum of 18 months exp. Excellent benefits.

IBM OS £4200
Minimum of 6 months' experience required by this site in Central London. Cheap travel concessions are only part of the benefit package offered.

IBM DOS £5400
Due to an increase to a third Shift, Operators/Senior Operators are sought by this East London site. Own transport could be an advantage.

IBM DOS £5100
Senior Operator required by this leading retail Co in North London. Excellent prospects for early career progression to Shift Leader plus discount on all Co Products.

ICL 1900 £4750
Operators with 1 year's + GII experience required for the Installation in West London. Someone with GIIS knowledge would be considered.

ICL 1900 up to £4400
Vacancies exist in East London and the City for Operators with 9 months plus GIIS, GII or manual operating experience. These positions offer good career progression programming and technical support, etc.

ICL 2900 £4300
Company in Essex is looking for an Operator with 1 year + Exec 1 experience although any 2900 exp would be considered. 2 shifts only with overtime available.

HONEYWELL £4500
Companies in West End and North West London are looking for Operators with 1 year + OS 2000/GCOS experience. Shifts only.

UNIVAC £4500
Installation in South West London has a vacancy for a Senior Op with Exec 8 experience.

TARGA COMPUTER SERVICES
3 LIVERPOOL STREET
LONDON EC2M 7NH
01-283 2751

KUWAIT/HOLLAND

PROJECT LEADER—KUWAIT c £15,000
5 years or more experience of ICL and Assembler. Some DLI knowledge preferred. Excellent starting salary plus accommodation provided for this Banking project in Kuwait. Knowledge of banking documentary letters of credit, automated data systems preferred.
Ref 841/3

PROGRAMMERS—KUWAIT c £12,000
3 to 5 years experience of ICL Assembler and DLI. Required to work on banking project. Knowledge of banking applications.
Ref 841/1

COBOL PROGRAMMER—HOLLAND £7,000
2 year commercial experience must have background in IBM 370. Manufacturing company with bureau operation. This vacancy is located in Holland for 2 year duration initially, subsequent return to UK.
Ref 839/1

COMPUTER BUREAU SALES CONSULTANT—U.K. c £12,000
A leading U.K. bureau requires a person experienced in the selling of hardware/software or alternatively a mechanical engineer with computer interests who is ambitious, a hard worker with the confidence and maturity. An 'A' level education at least and aged 25 or over are pre-requisites. Excellent prospects and company benefits including Holford.
Ref 839/3

Telephone or write to:
X.CALIBUR
Duke House, 2 Duke Street, Bedford
0234-48877
Computing Services Association Agency Licence SE/A/3345

X·Calibur
CONTRACT SERVICES

Owing to expansion and the introduction of two-shift working, the following posts have been created within our Computer Operations Department which is using an IBM 370/138 running under DOS/VS, POWER/VS, CICS and VSAM.

SENIOR OPERATOR

REF: CW/222
From £5158 p.a. inc.
Will be responsible to the Production Controller for the hour by hour operation of the Computer Room and Work Control area.

We are looking for someone with at least two years related operating experience — one of which must have been in the capacity of Senior Operator — a good knowledge of JCL and Work Control procedures.

OPERATOR

REF: CW/223
From £4102 p.a. inc.
For this post we are looking for someone with a minimum of one year's operating experience. A knowledge of work control procedures and DOS JCL would be a decided advantage.

Both posts have a minimum of 22 days leave per year and we have a subsidised restaurant and a Sports and Social Club.

The Royal Borough of KENSINGTON AND CHELSEA

Application form quoting appropriate reference number from the Chief Personnel Officer, Dept. 151, The Town Hall, Hornton Street, Kensington, W8 7NX. Tel: 01-937 8662 (24 hour answering service). Application form to be returned by 2nd April, 1979.

The Council welcomes applications from suitably qualified registered disabled persons.

Make your DP experience count.

£4K, £5K, £6K, £7K...

...With Programming and Systemsolve Limited, the nationwide Recruitment Consultants.

The positions registered with P & S cover the whole DP spectrum, from COBOL programmers to systems analysts to high flying salesmen.

The locations are throughout the U.K.

And the salaries?

If you can supply the experience, and of course the ability, we can supply the jobs with the kind of salaries you are worth.

We do not have the space here to list the scores of opportunities we have on our books but whether you have been working for twelve months or twelve years we would like to hear from you.

And we think you will like what we have to say in return.

Write or telephone today. 24 hour answering service.

pas 9-11 Tatton Street, Knutsford, Cheshire WA16 6AB. Tel: 0565 4925

ISLE OF WIGHT COUNTY COUNCIL

R.P.G. II Programmer

Salary AP3 £3732-£4146 inclusive

The County Council operate an I.B.M. 195K 370/115-2 with 3 x 3340, 2 x 3411, 1 x 2703, 1 x 3540, 1 x 2501 and applications are invited for the above post from programmers with at least 2 years experience of R.P.G. II associated with an I.B.M. installation working under DOS/VS and a good knowledge of VSAM would be an advantage.

The Authority offers assistance with removal and related expenses.

Application forms and job description can be obtained from the County Personnel Officer, County Hall, Newport, Isle of Wight.

Closing Date: 2nd April, 1979.

STOP PRESS

This Week's Specials

FREELANCE PROGRAMMING VACANCIES

U.K.		to £300 PER WEEK	
DEC	BASIC+	C. LONDON	3 MONTHS+
ICL 2903	COBOL	C. LONDON	6 MONTHS
IBM	COBOL DOS	PETERBOROUGH	6 MONTHS+
IBM	MK IV OS	C. LONDON	3 MONTHS+
VENTEX	DATAPOINT	C. LONDON	6 MONTHS
H.66	COBOL	ST. ALBANS	3 MONTHS+

OVERSEAS		to £400 PER WEEK	
IBM	COBOL CICS OS	SAUDI ARABIA	6 MONTHS+
IBM	DLI DOS CICS (PROJECT LEADER)	PARIS	1 YEAR
ICL	VMEK SPECIALIST	FRANCE	1 YEAR
ICL	LOW LEVEL ASSEMBLER	BRUSSELS	6 MONTHS
ICL	COBOL GIII	KUWAIT	6 MONTHS+

Ring IRENE on 01-995 4148

JUNIOR AND SENIOR CONSULTANTS

£8,500 to £12,000
CENTRAL LONDON

Six large, well-established consultancies wish to recruit systems people with all-round experience on third generation equipment and the right personality to deal with clients who require first-rate service. Technical Communications Consultants are also required where in-depth implementation experience of IBM or DEC latest ranges are essential. Excellent fringe benefits and prospects. CW 12/1 MICHAEL

OPERATOR/ DATA CONTROL

to £4,600 in CROYDON

A small insurance company requires an operator with 1 year's experience on ICL 2903/4. Only 1 shift system to start with on its new ICL 2904. Holidays of 4 weeks plus LVs. CW 12/2 TRICIA

DEC OPERATORS

to £5,500
LONDON AND HOME COUNTIES

We now have eight vacancies for PDP operators in the following locations: the City, Central London, Epsom and W.G.C. under various shift systems. All firms offer excellent perks. CW 12/3 TRICIA

SENIOR OPS/ SHIFT LEADERS

£4,500 to £6,100 Inc NR. FELTHAM

Would you like to work on the latest IBM 3030 machines? If you have good MVS experience and know JCL well, then this top grade Manufacturer and Service-Bureau would like to see you. Top-top perks and paid overtime. CW 12/4 TRICIA

OPERATORS/SHIFT LEADERS

£3,800 to £6,200
NR. RUISLIP, MIDDX

Why not come and work for a large, well organised company in the leisure business? Terrific company perks including free BUPA, C P S and 4 weeks hols. All you need is ICL GII experience of one year's minimum. CW 12/5 TRICIA

DEC PROGRAMMERS

£4,500 to £8,500
LONDON & HOME COUNTIES

We now have commercial user organisations and 30 Software/Consultancy firms looking for DEC Programmers with 15 months' or more experience. Why not ring us now and enquire about your chance to improve both salaries and status. RSTS or RT11 experience are added plusses. CW 12/6 MICHAEL.

ICL COBOL PROGRAMMERS

£8,400 N.W. LONDON

Now is your chance to move onto the new ICL 2900 range with 2 years' ICL 1900 COBOL experience. Excellent training facilities and one of the most modern installations in the country. Flexitime, staff canteen and an excellent S&S club. CW 12/7 MICHAEL

SYSTEMS ANALYST

£8,000 C. LONDON

A major retail organisation with a large investment in DP requires a well qualified analyst with a solid COBOL background. The successful candidate will work in a stimulating environment and obtain 4 weeks' hols., free lunches and generous discounts. CW 12/8 MICHAEL

PROGRAMMERS, S/As & PROJECT LEADERS

£4,000 to £7,000 ENFIELD

Why not join an important stable Transport company with the latest H66 computer? All commercial work is now using the latest DATABASE techniques and on-line enquiries are handled from a multiplicity of locations, using Level 6s and other minis. If you have COBOL experience on any byte computer then please apply now. CW 12/9 MICHAEL

JUNIOR PROGRAMMERS

£3,000 to £4,300 S.E. ENGLAND

You have only 1 year's commercial experience? Then you are in great demand. We have a large selection of first-rate companies who need people like you. Some offer mortgage assistance to the right candidates after short period with them. CW 12/10 TRICIA

RPGII PROGRAMMERS

£4,500 to £7,500
VARIOUS S.E. ENGLAND LOCATIONS

You have never been so popular! A minimum of 6 months' experience is needed. We now have vacancies in HIGH WYCOMBE, W 1, CITY, BRENTFORD, N.W.10, EAST & S.E. LONDON, WEMBLEY, BRACKNELL, GUILDFORD & WOKING. Some companies offer relocation expenses, mortgage assistance, flexitime and bonuses. CW 12/11 MICHAEL

PL1 PROGRAMMERS & AN/PROGS.

£4,200 to £7,700 S.E. ENGLAND

Are there any of you rare creatures around? We now have vacancies in the CITY, N. LONDON, ENFIELD, BEDFORD, MAIDSTONE, TUNBRIDGE WELLS, BRIGHTON, CROYDON, REDHILL, BRENTFORD, SLOUGH & HARROW. Come on, don't be shy, phone us NOW! CW 12/12 MICHAEL

CUSTOMER SYSTEMS SUPPORT

c£8,000 + CAR C. LONDON

This major International terminal and mini manufacturer requires three first-rate Systems Analysts to advise, design and install a variety of Real Time applications based around Mini or O E M Mainframe Computers. Excellent opportunity for advancement and top company perks. CW 12/13 MICHAEL

UCA Recruitment Consultants
UNIVERSAL COMPUTER ASSOCIATES LIMITED
01-995 3883 (01-958 6138 Evenings)
Data Express House, 3 Prospect Place, Heathfield Terrace, Chiswick W4

Top Ops

Permanent	**INTERSCAN V.D.U.** W.C.2 Senior Data Control Clerk wanted. Min. 1 yr. experience. Age 25+. Hours 9-5. £3400++. Call Elaine or Sally.	Top Ops	**IBM DOS VS POWER OPERATORS** Work available in Middlesex, London & Essex. £130 p.w.+	Contract	**DATA CONTROLLERS GEORGE 3** We have various long term assignments available, at least £125 pw + Day shift only. Call now for details.
Permanent	**IBM 370/135 DOS/VS GRASP** WEMBLEY PARK 1-2 yrs. DOS exp. req'd for Operator. 3 shifts, O/T available. 4 wks. hols and mortgage subsidy: £3680 neg. Call Elaine or Sally.	New Business	**ICL GEORGE 3 OPERATORS** 3 shifts system. 1½ year booking. KENT. Call June Mogg now.	Contract	**OPPORTUNITIES IN EUROPE** We have over 100 Operations staff working in Europe today! Call now for information and advice.
Permanent	**IBM SYSTEM 3/15D** N.19 Senior Op. with 1 yr. System 3 exp. 2 shifts — soon to be 3. Up to £4750. Call Sally or Elaine.	New Business	**HONEYWELL OPS** S. Ireland & Essex. OS2000 & GCOS Ops. Call us now.	Contract	**REDUNDANCY CAN HAPPEN TO ANYONE** Experienced operators can rely on Knight for advice and the best contracts.
Permanent	**ICL 2904** E.C.3 Company moving to Redbridge, Essex (in May) require Operator. 12-18 mths. 2904 exp. 2 shifts. £4-£4,600 incl. Call Sally or Elaine.	New Business	**IBM 370/138 DOS/VSI - BRENTWOOD, ESSEX** Permanent Op req'd with 2 yrs OS/VSI exp. Salary £5,000 incl. 3 shifts. Call Elaine or Sally.	Contract	**OS JCL WRITERS 'THE GRAND DUCHY'** IMMEDIATE. Long term contract for those who want a job with a difference. Earn at least £230 pw +. perks. Basic French useful.

Knight

01-491 4706

Mini & Micro Programmers Designers + Analysts

London
Up to £8K

A prestigious Systems Group, subsidiary of a multi-national corporation has retained Matrix to aid in recruitment of new project members. Our client requires Programmers, Project Leaders and Systems Designers with either PDP 11 or NOVA 3 experience using PASCAL or Mini Assembler. Previous involvement in control systems based on multi-processor configurations would be an advantage but is not a prerequisite. Senior appointments anticipate 4 - 5 year directly relevant experience. Whilst salaries are high, the prime attractions of these positions are job interest and growth potential. If you are an achieved Real-Time Mini or Micro specialist our client promises to meet any realistic expectations and will complete interviews and make offers without any of the customary delays. A number of fringe benefits accompany this excellent package and a company car will in many instances be provided. Please telephone quoting this advertisement reference. Ref. 2203/1

PDP-11 Project Leaders Senior Programmers

C. London
£6 - 9K

The foremost British Systems and Software Consultancy Group is seeking Senior project members in the areas of Data-Communications Message Switching and basic software. A prerequisite is experience of PDP 11 based systems ideally using RSX 11M. Analyst/Programmers will be skilled in the use of either Coral 66, Macro 11 or PASCAL. These appointments are for a new Real-Time Systems division and successful applicants will have the opportunity to establish themselves at a very senior level in a short time span. The Group anticipate offering salaries well above prevailing market levels with the objective of attracting top expertise. In addition to an excellent salary you will be offered an excellent package of fringe benefits and the promise of an early review. Travel opportunities are available to those who enjoy visiting Europe on business. A company car is available to some of the Senior appointees. Interviews will be held in London as soon as applications are received. Ref. 2203/2

Mini Software at Logica

Holland & Belgium
£10,000 - £16,000 p.a.

Would you like to join the Dutch subsidiary of a world leader in Mini & Micro computer applications? The company itself is a British based international group with offices in five continents. They specialise in the supply of Bespoke turnkey systems based on Mini & Micro processors specifically in the Communications, Message Switching, Network, Process Control and basic software fields. Any assembler language is desirable. To meet their expansion goals they are creating numerous additional specialist project teams requiring Consultants, Project & Team Leaders, Analysts and Programmers at various levels, specifically a) 5 years plus b) 2-5 years c) Trainees up to 2 years. If the idea of working at the sharp-end of sophisticated technical computer pioneering appeals and joining a very prestigious company is meaningful in your career development then you must give consideration to these opportunities. Ref. 2203/3

Minis-Micros Designers, Programmers

H. Counties & Cheshire
£6.5 - £9K

A prestige Client with Headquarters in London and regional offices located in Cheshire and throughout Europe urgently requires the following: Real-Time & On-Line Programmers & Systems Designers, Database & Compiler specialists with 2-5 years solid experience. Of particular interest would be people with relevant experience in one or more of the following: DEC with either BASIC, RTL II or CORAL, IBM or ICL with COBOL, Assembler or PL/1. Also Ferranti Argus or IMS or Database specialities are welcome. The scope of projects is both broad and demanding and certainly in keeping with the prestige of this client. You will play an important role in project development and will be given considerable autonomy in developing your technical expertise and enhancing your contribution to the work of this reputable group of which you will be more than proud to be a member. Matrix have been given a brief to pre-select suitable personnel and to recommend salary grades in line with our experience of prevailing market levels. We anticipate Salaries of between £6 and 9K being accepted. Ref. 2203/4

Database Designers & Analysts

Holland, Germany & London
£6-8K (U.K.)
£10-15K (E.E.C.)

An International client with offices in London and Europe is entering another major expansion phase for which they require additional Database expertise including Project Leaders, Systems Designers, Analysts and Senior Programmers. The latter should be skilled in either PL/1, COBOL, Assembler or Mark IV. Both Database and Data-Communications experience would be welcome. Applications are varied but include Banking systems, Airline booking and Stock control. Not less than two years relevant experience will be considered and for more senior positions 4 years is the minimum. U.K. based personnel may have frequent opportunity to travel to Europe and the U.S. (If desired). Europe based personnel are given very generous expenses and frequent paid trips back to the U.K. Salaries needless-to-say are going to be well above the norm in keeping with the client's prestige and the importance which they place on the acquisition of these key personnel. You will be interviewed either in London or flown out for the day to Amsterdam or Frankfurt. Ref. 2203/5

Classifieds

Tel: 01-409 0468

MATRIX

360 Oxford Street, London. WIN 9HA.

BASIC or CORAL programmers with either commmercial or scientific backgrounds required by important Central London based Client. Permanent or contract positions available at salaries of £6-8K or £235p.w. up. Ref. 2203/6

COBOL or PL/1 programmers are required contract or permanent by a City Institution. IBM OS is preferred but DOS considered. Two years min. experience essential. Salary: From £5 - 5.5K plus 2½% mortgage subsidy or £250 p.w. Ref. 2203/7

ANALYST/PROGRAMMERS required for Croydon area. IBM OS, COBOL, PL/1 or Assembler. Financial systems experience advantage. Salary up to £8.5K. Ref. 2203/8

CITY — Systems Programmers for Merchant Bank with 370 OS experience including PL/1 or COBOL would be advantageous. Salary c.£6.5-8K + mortgage. Ref. 2203/9

BRUSSELS — T.P. and D.B. Applications and Software Programmers. Prefer IBM software. Full relocation expenses and vast range of real company benefits whilst salaries to £16K. Interviews at London office. Ref. 2203/10

BERKSHIRE/HANTS BORDER — Micro specialists (Intel 8080, Zilog Z80) required by turnkey systems supplier. Established U.K. company can offer outstanding career positions. Salaries to £8K +. Ref. 2203/11

DENMARK + GERMANY — IBM IMS and/or Univac 1100 DBMS applications exposure required for early 1979 start. Prefer permanent career person but consider contract. Ref. 2203/12

IMS Analyst Programmer. O.S. with either COBOL, PL/1 or Assembler experience. Central London based. Salary dependent on experience to £8250. Financial systems background preferred but not essential. Ref. 2203/13

THE POLYTECHNIC HUDDERSFIELD
Department of Computer Studies and Mathematics

SENIOR LECTURER OR LECTURER II COMPUTING / INFORMATION SYSTEMS
Ref: ACA/306

The principal degree and diploma courses within the Department involve major studies of applications of computers in business, industry and public authorities.
Applicants should have appropriate practical experience of at least one of the following areas:
(a) information analysis and systems design
(b) applications programming
(c) design and implementation of data bases
A good Honours Degree and/or MBCS is essential.
Staff are expected to undertake activities, including research, in addition to teaching duties.
Salary:
SL £6501-£7065 (Bar) — £7672
LII £4101-£6853
Further details and application forms, which should be returned by 5 April 1979, from the Personnel Office, The Polytechnic, Queensgate, Huddersfield HD1 3DH. (Telephone 22288 Ext. 2225).

UNIVERSITY COLLEGE, CARDIFF
Department of Sociology, Law and Computing Mathematics

S.S.R.C. Research Studentships

Applications are invited from candidates who have, or expect to obtain in July 1979, good honours degrees in relevant subjects for research studentships in the following areas:
Sociology (3)
Sociology and Law (2)
Sociology and Computing Mathematics (1)
The studentships are tenable for two years from October 1st, 1979. Further information may be obtained from David Berry, Department of Sociology, University College, P.O. Box 78, Cardiff CF1 1XL.

COUNCIL FOR NATIONAL ACADEMIC AWARDS
is seeking a

SYSTEMS ANALYST

Preferably with several years' proven experience of designing and implementing systems serving operational and information retrieval needs, for appointment to the Council's information system, comprising a range of educational records, being maintained for review and redesign in order to improve efficiency, facilitate enhanced information management and develop staff roles and responsibilities.
An initial understanding of the position of advanced courses and of the CNAA in the public sector of higher education, though not essential, would be a considerable advantage.
The Council is the largest single degree awarding body in the United Kingdom, associated with over 130,000 students on some 1800 courses at institutions of higher education throughout the country.
Preference will be given to candidates with an interest in, or experience of, designing computer systems employed on user participation.
The initial salary will be within the range £6828-£8292 pa, with a possible extension to £9060 p.a. 25 days annual leave, contributory superannuation scheme.
Further particulars may be obtained from: Assistant Secretary (Staff), Council for National Academic Awards, 344/354 Gray's Inn Road, London WC1X 8BP.
Closing date for receipt of applications 6th April 1979.

IBM OS SHIFT SUPERVISOR £3000
Four years' operating experience is a requirement for this City-based company running an IBM 370 under OS VS1. Applicants, who should be conversant with OS JCL and Utilities, will benefit from the planned subsidised mortgage to offered.

IBM DOS/OS TECH. SUPP. £5000-£6500
We have a number of clients in the Middx area who are seeking Operation Technicians. For these position teams of which are on DOS/VS, OS/VS, the prime requirement is a thorough understanding of JCL and Utilities. Some experience within a technical support or systems engineering role would be an advantage.

IBM OS DEP. SHIFT SUP'R c£5500
Our client, based in Central London, requires a Dep. Shift Supervisor with a minimum of 3 years' operating experience for a 370/158 under OS VS1. Good prospects and excellent fringe benefits.

IBM DOS SENIOR OPERATOR c£5000
Major international banking organisation located in E. London requires a Senior Op. with a minimum of 18 months' exp. for its new IBM 370 installation under DOS VS POWER. Outstanding benefits include subsidised mortgage and annual bonus.

ICL SENIOR OPERATOR £5000
Excellent opportunity for an operator with approx. 18 months' Gen 2 exp wishing to work in N.W. London Mini-range ICL 1900 under Gen 2 + run on a 2-SHIFT system. Benefits include free meals, 3 weeks' holidays and extensive sports facilities.

ICL SENIOR OPERATOR x 2 c£4800
ICL OPERATOR x 2 c£4500
Experienced operators are required to run this progressive commercial installation situated in W. London. The hardware comprises two ICL 1900 machines under their 2-Manual run on a 3-shift system. The ideal applicants will be those seeking investment and responsibility in a challenging and rewarding environment.

OPERATIONS VARIOUS

2904	Op	18 mths +	Exec 1/2	3-shift	City £6K+
2903/4	Sen Op	12 mths +	Exec 1/2	3-shift	Herts/Sy £6K
2900	Op	12 mths +	G2/VM/L	2-shift	Essex £6K
2904	Jun Op	6 mths	Exec/Gen	3-shift	City £6K
370	Op	2 yrs	OS VS1	2-shift	Kent £6K
370	Op	12 mths	OS VS1	3-shift	Herts/Beds £6K

JNR ASSEMBLER PROG £NEG
A WORLDWIDE CONCERN based in Buckinghamshire requires programmers with a knowledge of DOS /DOS VS assembler. You will be working on a range of developing application software, be in your twenties and with a good 'O' level education. You will benefit from a comprehensive training programme and the chance of an excellent career.

SYSTEMS ANALYSTS £7500+
This North London based client requires analysts with 2 yrs + RPG to COBOL Programming experience. Their development programme is exciting and includes database. The hardware is 370/138 with System 3 terminals. A good salary + bonus is offered together with restaurant, pension, life assurance and subs BUPA

Computer Two Thousand
[illegible]
24/28 Bloomsbury Court Road
London WC1A 2TA
Telephone: 01-637 3265/6

Royal Engineering College
Manadon, Plymouth

Senior Computer Programmer

The College is primarily concerned with the education and training of naval Engineering Officers to achieve those standards required for chartered engineer status. It has extensive, well-equipped Laboratories and computer facilities to support the activities.
The programmer appointed will be responsible for developing programming techniques and applications programming in the College, particularly computer graphics, and will advise staff and students in this area. In addition, the successful candidate will take responsibility for, inter alia, the design and implementation of a Computer Assisted Learning Package, the support of the GINO-F software of the Xerox Sigma 6 Mainframe Computer and advising on the selection, purchase and acceptance of equipment.
Candidates, normally aged under 30 should have a good honours degree or equivalent in an appropriate discipline and some programming experience.
Appointment as Higher Scientific Officer (£4060-£5450) or Scientific Officer (£2840-£4060) according to qualifications and experience.
For further details and an application form (to be returned by 5 April 1979) write to Scientific Personnel Officer, Admiralty Underwater Weapons Establishment, Portland, Dorset DT5 2JS. *Please quote ref: SA/11/FPA.*

Science Group
CIVIL SERVICE

Contract Requirements

IBM MVS SYSTEMS PROG.	—	HOLLAND
PDP-MUMPS	—	HOLLAND
PDP BASIC + 2	—	HOLLAND
PDP BASIC	—	SURREY
IBM OS Pl/1 + IMS	—	HANTS
VENTEK DATASHARE	—	MIDDX/LONDON
ICL 1900 PLAN	—	EAST LONDON

Call Richard or Suzy on 01-491 4706
Knight Software Division
Staff Services Division

MYRIAD

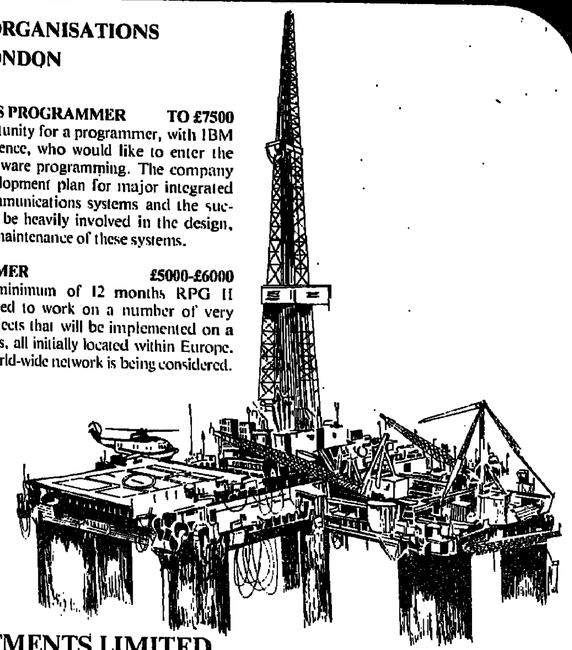
JOIN ONE OF THE WORLD'S MOST SUCCESSFUL ORGANISATIONS
IBM 370 AND SYSTEM 34 IN CENTRAL LONDON

TWO ANALYST/PROGRAMMERS £6000-£7000
Candidates should possess a strong COBOL background with design experience and be willing to accept responsibility for a variety of projects, many of which will be implemented in Europe. Applicants must therefore expect a limited amount of short duration travel. Proven analysis experience will command the higher salary but PROGRAMMERS seeking a career advancement will also be considered.

COBOL PROGRAMMERS £5000-£6500
Successful applicants will be required to work on a wide variety of information systems using the latest hardware and software techniques. A background in DOS/VS would be useful but full training on IBM equipment will be given if necessary. These positions offer excellent opportunities for programmers wishing to gain database and teleprocessing experience within a progressive environment.

TRAINEE SYSTEMS PROGRAMMER TO £7500
This is an ideal opportunity for a programmer, with IBM ASSEMBLER experience, who would like to enter the specialist area of software programming. The company has a long term development plan for major integrated database and telecommunications systems and the successful applicant will be heavily involved in the design, implementation and maintenance of these systems.

RPG II PROGRAMMER £5000-£6000
Applicants with a minimum of 12 months RPG II experience are required to work on a number of very interesting, large projects that will be implemented on a network of System 34s, all initially located within Europe. The possibility of a world-wide network is being considered.



Our client, a major oilfield services company, forms part of one of the world's most profitable and fastest growing corporations and has recently embarked upon an extensive data processing expansion plan which includes the addition of IBM System 34s and a database for the 370 (a 4341 is being considered).

All these positions are accompanied by a NON-CONTRIBUTORY PENSION SCHEME, a season ticket loan, 4 weeks holiday and luncheon vouchers.

MYRIAD APPOINTMENTS LIMITED
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Our client is a dynamic manufacturing and marketing organisation with factories and sales offices throughout the world. It sells high quality electronic equipment through a high street dealership network and has achieved an impressive market penetration in a particularly competitive sector of business. With a multi-million pound turnover in the U.K., in the trade the company enjoys the enviable reputation of extreme efficiency which is due to an enthusiastic workforce and very effective computer-based systems built around an IBM 370/138. The D.P. Unit is surprisingly compact but staffed by dedicated professionals. Local and remote VDU's service the countryside user base and RJE is provided by 3741's. An IBM System 34 will be installed at their South Wales factory in Mid-1979. To cope with planned growth AN ORDER HAS BEEN PLACED FOR A 4341 2 MBYTE PROCESSOR UNDER DOS/VSE and additional staff are now required to prepare for its introduction.

SYSTEMS ANALYST c.£6,692

- Around 2/3 years D.P. experience
- Good commercial systems background
- At least 12 months spent programming in a Cobol environment (IBM preferred)
- Implemented at least one system
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- At least 3 years programming experience
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SYSTEMS ANALYSTS to £7,000

should not have less than 2 years' analytical experience with either programming background or sound commercial or business experience.

PROGRAMMERS to £6,000

will only be considered if they have a minimum of 12 months' commercial experience of writing Cobol on mainframe hardware.

These positions offer career-minded individuals the opportunity to really expand their knowledge of the design and implementation of a fully integrated databse together with extensive teleprocessing.

The fringe benefits offered by this major international company are not only the usual four weeks' holiday, Pension Scheme and Sick Pay but also include generous relocation expenses (where appropriate) and a subsidised canteen and sports and social facilities.

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For further information and an application form, telephone us today quoting ref. no. PJ 79663 on the following number.

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Shift work in operation but no night or weekend work at the moment

Salary circa £3 500 p.a.

4 weeks holiday Subsidised canteen.

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We require people, male or female, who have either:

A minimum of two years experience on computing equipment and associated peripherals or formal electronic qualifications such as HNC or ONC plus digital experience, or relevant H.M. Forces experience.

Redifon offer attractive salaries, overtime and company car plus the normal benefits associated with an expanding, progressive company.

Apply to:
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Telephone: Crawley (0293) 31211 Ext. 278.

RESEARCH OFFICER MINICOMPUTER SYSTEMS

The Medical Research Council Cyclotron Unit has two Hewlett-Packard 1000 computer systems providing on-line and off-line computing facilities for a small number of research laboratories.

Applications are invited for the above post from persons with a degree or HNC and experience in a scientific computing environment. Knowledge of Fortran and an Assembler language is essential. Experience in H-P systems is an advantage but training will be provided.

The successful candidate will contribute to the further development of a data acquisition and control system for the Cyclotron at all stages from programme design to commissioning, and will also undertake advisory and programming work of a more general scientific nature using interactive development facilities.

Salary, according to age and experience, in the range £3936-£6256 (inclusive of London Weighting).

Apply, giving full details, to Miss Alison Pirot, M.R.C. Cyclotron Unit, Hammersmith Hospital, Ducane Road, London W12 0HS. Tel: 01-743 6504, Ext. 103.

THE OPEN UNIVERSITY

COMPUTER OFFICER IN DESIGN

A Computer Officer in Design is to be appointed within the Design Discipline, Faculty of Technology. The post is available immediately. The successful applicant will be required to work in association with a small research team on a number of ongoing research projects concerned with studying spatial configurations and relational structures relevant to design in a variety of technological fields. The current system consists of a DEC-11/34 C.P.U. and a VT-11, graphics system, running under RSX-71M. Knowledge of inter-active graphics and familiarity with DEC software is essential.
Salary will be on the scale £3,384-£4,882 p.a. (under review).

Application forms and further particulars are available from The Recruitment Office (MH3109/1), The Open University, P.O. Box 75, Walton Hall, Milton Keynes, MK7 6AL, or telephone Milton Keynes 63405: there is a 24-hour answering service on 63866.

Closing date for applications: 29th April.

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VACANCIES exist at all levels within the PICA team to develop real-time software for applications in the Printing and Publishing Industry. All positions are newly created and initially associated with the development and support of Composing System 700 (CS7), the highly successful disc-based on-line Composing System produced in conjunction with Ferranti Ltd. PICA offer unique opportunities for the right people to contribute to both the technical and commercial future of this product.

Current major projects are within commuting-distance of our new offices at Feltham, Middlesex. Opportunities will exist to work on European projects.

COME AND JOIN THE PICA TEAM

Applicants should normally possess a degree or similar qualification or have proven ability and experience. Two vacancies will be of particular interest to newly qualified graduates.

Top salaries will be paid to the right people, so if you are interested in working with an enthusiastic team in a challenging environment, please write for an application form to:—

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PICA Computing Services Ltd.,
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Feltham, Middx.

PORTSMOUTH POLYTECHNIC

Computing Centre

Applications Programmer

Post No. 777

We have recently installed an ICL 2960 and an ICL 2904 to provide a wide-ranging computing service to the whole Polytechnic. The Computing Centre seeks to recruit a programmer of graduate or equivalent qualifications and some previous experience, and wishes to increase his experience by working on a variety of applications, non-scientific and/or administrative, based on advanced computing facilities. There is a wide range of projects now being started including graphics software. Implementation of the IDMS database, and software to support minicomputers linked to the 2960.

Salary Scale: AP2/4 up to a maximum of £4,827 including supplement.

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THE BENEFITS OF WORKING WITH *TASK FORCE*

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- *Registration for VAT benefits you on all your outputs, we of course administer the accounts.*
- *As a limited company you can have a lease car arrangement (tax free payments) which we will provide and organise for favourable terms.*
- *We can get you insured against long-term sickness and set up a pension plan.*
- *Long term service qualifies you for holiday payments.*
- *End of contract bonus schemes and retainer deals can be negotiated.*

In return we want good relevant experience, we only use the best computer professionals. If that's what you are, and even the deal detailed above doesn't interest you we will consider taking you permanently — salary negotiable to £9,000 + car + travel (UK and Overseas) + training + security + usual benefits.

Selection of current Task Force requirements:

I.B.M.	**Assembler/COBOL Programmers** OS/VS, DOS, CICS, CMS Exposure Adv. Midlands, N.W. of England and London.	CIRCA £260 p.w.
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Programmers

LEEDS

£3860/£5210 per annum plus a self-financing productivity payment

Applications are invited from programmers with at least one year's experience ideally in Cobol.

The successful applicants will join a programming department (about 27 strong) which has an impressive record of producing quality software on time using on-line programming facilities. The work is demanding and stimulating with a wide range of applications under development.

The Board's computer installation comprises a dual ICL System 4.70/4.72 with an extensive communications network and a dual ICL 2972 configuration is scheduled for delivery in early 1980.

Conditions of service are excellent and include:

- ★ 4-5 weeks' holiday
- ★ flexible working hours
- ★ contributory pension scheme
- ★ regular salary adjustments
- ★ subsidised restaurant

Applications, quoting the vacancy number 29/79 should be forwarded to the Secretary, Yorkshire Electricity Board, Scarcroft, Leeds LS14 3HS, to arrive not later than 30 March, 1979.

Yorkshire Electricity Board

SYSTEMS ANALYST

Cumbria **up to £6,500**

An interesting and challenging opportunity has arisen for a Systems Analyst to look after a new installation (Honeywell 62/20) which is currently being commissioned.

Our Client, part of a major engineering group, specialises in the design and manufacture of heavy mechanical handling equipment.

Located in Cumbria, he/she will be responsible to the Financial Manager for co-ordinating computer systems development, promoting the standardisation of systems and liaising with senior management and user departments. Occasional travel may be necessary.

The successful applicant will have previous experience of analysis, design and implementation of systems in a manufacturing environment.

Attractive conditions of employment are offered together with generous assistance with relocation costs, where appropriate.

Please write with full career details to:
Joan Swaine, Recruitment/Classified Controller,

severn
Personnel Recruitment,
Hooley Lane,
Bradford BD4 7SP

TYNE AND WEAR COUNTY COUNCIL
COUNTY TREASURER'S DEPARTMENT

COUNTY TREASURER'S DEPARTMENT

SYSTEMS ANALYST
(Salary up to £6,060)

COMPUTER PROGRAMMER
(Salary up to £6,073)

Applications are invited from experienced personnel or from persons wishing to enter the systems and programming field for the first time.

The successful applicant will join a highly skilled and experienced development team working on a wide variety of financial, administrative and technical computer systems.

The County Council operates an ICL 1904S computer with 192K core store, 11 EDS80, magnetic tapes and drums, which supports a communications network of over 60 terminals, used for on-line processing, data capture and MOP development.

Written applications, stating age, qualifications, current salary and experience to date, and naming two referees, should be sent, not later than 30th March, 1979, to The County Treasurer, Tyne and Wear County Council, Sandyford House, Archbald Terrace, Newcastle upon Tyne, NE2 1ED.

Papua New Guinea

National Computer Centre

Applications are invited from suitably qualified and experienced men for the following posts within the National Computer Centre on a 3 year contract basis (renewable in most instances).

Systems Analysts (L8)

Applicants should have a sound knowledge of ICL 1900 series hardware and software and a minimum of two years COBOL programming experience plus two years systems analysis and design. Preference will be given to candidates with supervisory experience and the ability to liaise with users. Must have completed at least one major project.

Programmer (L6)

To write and maintain application programs and analyse and design small systems. Applicants should have a mimimum of 3 years programming experience in COBOL plus a good knowledge of ICL hardware and GEORGE operating systems would be advantageous, as would a knowledge of PLAN, TABN, MAXIMOP and ICL standard software.

Senior Technical Officer (L8)

A senior member of the Technical Support Group which provides technical support to Systems/Programming Section, Operations Section and User Departments. Applicants should have extensive EDP systems/programming experience, particularly with ICL hardware/software including as minimum of 4 years programming experience in COBOL AND PLAN with a sound knowledge of GEORGE and ICL standard software. A knowledge of FORTRAN and/or FILETAB in addition would be an advantage.

Technical Officer (L6)

To maintain the technical library and ensure that all software is kept up to date. Also assist in the development of Systems/Programs especially where technical aspects of design or technical problems are concerned. Applicants should have a minimum of 3 years experience in some or all of the following areas, COBOL, PLAN, FORTRAN, FILETAB, GEORGE, ICL hardware/software.

Operations Supervisor (L8)

To supervise and administer the day to day operation of the centre. Sound knowledge and experience of ICL 1900 series hardware and software and of GEORGE operating system, preferably GEORGE 2+. Good knowledge of communications systems and the ability to communicate/liaise with all levels of technical and non-technical staff.

Bureau of Statistics National Census Programme

Applications are also invited from men to make up the staff of a temporary unit set up in February this year to carry out a population census of Papua New Guinea. It is anticipated that the census will be completed in 1981 and contracts will therefore be approximately 2½ years, but will be determined by applicants' availability to start.

Processing Supervisor (L8)

To control and supervise all aspects of data control and data preparation relating to the processing of census data. Applicants should have several years data control experience in a supervisory role and good knowledge of a data preparation technology.

Analyst/Programmer (L8)

To be responsible for various aspects of the development and implementation of computer systems. Applicants should have a sound knowledge of ICL 1900 hardware and software. Experience must include at least 2 years programming in COBOL and preferably at least 2 years in systems analysis and design.

Programmer (L6)

To write and maintain application programs, working from prepared specifications. Applicants must have relative EDP experience, preferably including at least 3 years programming in COBOL and a good knowledge of ICL hardware and software and GEORGE operating system. A working knowledge of TABN, MAXIMOP would be an advantage.

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In addition to salaries we offer:-

- * Gratuity of 24% per annum of annual salary taxed at a flat rate of 2%.
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Pay per annum

Payable in Kina. Salaries per annum expressed as approximate sterling equivalents.

Level	Salary
6	£6,376
8	£8,297

Please write or telephone, quoting Refs: VIS/PSC-NCC/10 and VIS/PM-BS/8, for an application form and further details to The Recruitment Attaché, Papua New Guinea High Commission, 14 Waterloo Place, London SW1R 4AR. Telephone: 01-930 0922.

Papua New Guinea

UNIVERSITY OF SOUTHAMPTON
SYSTEM DEVELOPMENT

Applications are invited for two posts in a team currently developing campus and regional networks, microprocessors and distributed systems. The Computing Service is based on facilities at Manchester and London using CDC 7600 computers as well as the local computers of a dual processor ICL 2970 and a large PDP 11/45. The current development aspects include a major extension of interactive facilities, including graphics and the integration of computing facilities into a distributed system. The successful applicants should possess a degree or similar experience and for one post preference will be given to a person with an engineering degree or hardware experience.

The appointment will be in the salary range 1A or 1B (£3384-£5898) plus superann (under review). The starting salary will depend on qualifications and experience.

Further particulars may be obtained from Mrs. P. Veighey-Smith, The University, Southampton SO9 5NH, to whom applications should be sent by 6th April, 1979. Please quote reference 1960/A.

THE POLYTECHNIC, HUDDERSFIELD
DEPARTMENT OF COMPUTER STUDIES AND MATHEMATICS

SENIOR LECTURER or LECTURER II (Two Posts)

Ref: ACA/274

Applications are invited for the above posts which are to support and develop the work of the Department in Computing. The principal degree and diploma courses within the Department involve major studies of applications of computers in business and industry. Applicants should have appropriate experience of at least one of the following areas:

1. Information analysis and systems design
2. applications programming
3. design and implementation of data bases.

A good honours degree and/or MBCS is essential.

Staff will be expected to undertake activities, including research, in addition to teaching duties.

Salary: LII £4101-£5158
SL £6081-£7068 (Inc)-£7572

Further details and application forms, which should be returned by 30 March 1979, from the Personnel Office, The Polytechnic, Queensgate, Huddersfield, HD1 3DH. Telephone: 0484 22288, Ext. 2226.

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Our growing business requires that we maintain leadership in technical support to our demanding and sophisticated customer base.

We need dynamic, competent people to become part of our growing team of technical specialists and be a part of the exploding microcomputer industry in a leadership position with Zilog.

The function involves applying knowledge of hardware and software with emphasis on software, the preparation of documents for publication, and presentation of technical material at seminars, conferences and training meetings.

If you are trained in Computer Sciences (or Electrical Engineering with computer background) and you meet our needs we are prepared to match your skills and experience with an attractive compensation package as a member of our leadership team.

Write to Peter Beskett, European Systems Manager, Zilog (UK) Limited, Nicholson House, Maidenhead, Berkshire.

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You should have experience of Account Sales Planning, National Accounts, type users, long term/complex negotiations, resource management.

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Bermuda

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A thorough knowledge of DMS II or similar Database system would be of particular interest.

The Company is a distributor of computer hardware and related systems for Burroughs, and is now one of the largest trading companies on the Island. If you would like to work in this pleasant environment and have the confidence to manage your own projects, an attractive remuneration package, including a tax free salary, is available.

Interviews will be held during the first week of April at our London offices. Preference will be given in the first instance to single candidates or those without children, because of immigration requirements.

To apply for this position, please contact Sarah Hurn on 01-242 9356 (Days) or 01-673 0205 (Evenings and weekends) quoting ref. 483/CW/SH.

Land use data —Computer input work

up to £4669

Vacancies exist for Technical Officers in a research team which compiles, stores and provides statistical data relating to the use of all land in the Greater London area. The team collects data on numbers of dwellings, areas and floorspace used for commerce, industry, offices and shops, numbers of parking spaces, areas of open space development etc. The information obtained is used by the Council in connection with its strategic planning and transportation policies. Sources for the analyses range from planning applications and permissions and borough statistical summaries to GLC Land Use Survey and development control material and site plans for proposed development. After training, officers may be involved in preparatory work for a London-wide Land Use Survey to be carried out in 1981.

The Officers appointed will work on analysing the more significant planning permissions granted by the 33 London Boroughs, the GLC and the Department of the Environment. They will be responsible for supervising and checking the work of junior technical officers, analysing and more complex permissions themselves and dealing with computer edits. Experience of computerised data handling at technical level is desirable.

There are also vacancies for junior technical officers in the team (salaries up to £3640) to undertake the analysis work. Previous experience is not required but an interest in, and aptitude for geography and mathematics would be an advantage.

Excellent conditions including over 4 weeks holiday a year plus an extra day off each month. Application forms (returnable by 6 April) from the Establishment Officer, Department of Planning and Transportation (PT/A/EO/1206); Room 454B, Main Building, County Hall, London SE1 7PB. Tel. 01-633 7791/6390.

GLC Planning & Transportation

Systems Specialists with Database and Data-Communications experience

In Holland you can earn £12,000-£15,000!

Experienced DB/DC Specialists

You should have experience of a high level language and at least 5 years mainframe systems experience, preferably with IBM 370/158. Database and Data Communications expertise is essential. You should be skilled in CICS, IMS, MVS, or VM. If you're no more than 32 years old, then you could be the person we're looking for. We can offer you many opportunities for extending your knowledge and experience to fit the changing demands of the 1980s. This means real career progression for you. The salary you'll receive in Holland will be the equivalent of between £12,000 and £15,000.

Cobol Programmers

In Holland you can earn £8,000-£12,000!

Cobol Programmers

You should have at least 3 years IBM Cobol experience, preferably with OS/DOS, JCL. We need you to join our team of Cobol coaches, who give individual programming instruction on our courses given by our education department. We will give you 2 months training to acquaint you with our programming standards. The salary you'll receive in Holland will be the equivalent of between £8,000 and £12,000.

Volmac: Holland's Leading Software House

Our twelve years in the business have taken us to the top. And we're still growing. By ensuring that all our 400 employees are of the highest standard, and by our quality of service, we've earned ourselves an enviable reputation. This means that those able to meet our requirements are the best paid software specialists in the Netherlands. Volmac's headquarters are in Utrecht, and we have 11 branches throughout the Netherlands.

A permanent and fascinating job in Holland

You'll have all the advantages of being directly employed by Volmac. This means you'll pay Dutch income tax, which at these salary levels is less than British tax. You'll also be coming to live in the Netherlands. If you're a married man, you'll be bringing your wife too. Volmac will help with your removal and contribute towards the cost. We'll give you a company car and generous expenses. What's more, you'll have paid holidays of up to 27 days a year.

RING 01-723 12 77

If you have the necessary knowledge and experience, this is your chance to profit from it. A Volmac executive - Mr. Jan van Wensen - is currently in Holiday Inn Hotel London Marble Arch, George Street, London W1H6KN, where he'll be pleased to interview you. Ring 01-723 12 77 for further information and to make an appointment. The final step will be a visit to Volmac in the Netherlands, at our expense. Full-scale interviews there will show whether you and Volmac suit each other. You'll be made an offer immediately.

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The recruitment industry is a demanding yet rewarding profession and as we almost exclusively work on assignment based recruitment campaigns you must be capable of high level client contact and possess the ability to broaden our existing client base. Above all we are looking for a self-motivated, successful sales professional who is looking for a challenge and who has the personal attributes to work with a great deal of enthusiasm and commitment.

In return you will be given a substantial income package, a company car, fringe benefits that include BUPA and free life assurance as well as offering you tremendous scope for personal achievement and development.

Anyone already working within the recruitment industry, wishing to specialise in the sales and marketing field, should also contact, for an informal and confidential discussion:

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OR Hagley 4166 (evenings & weekends)

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SYSTEMS ANALYST up to £6,500
ANALYST PROGRAMMER up to £5,500
PROGRAMMER up to £5,000

Based in Kingston-upon-Hull

Our client is a well established group with its Head Office in Kingston-upon-Hull and a number of manufacturing distribution sites nationwide. Two of these sites already have R.J.E. links to the IBM 370/138 which is running under DOS/VS and uses SHADOW II and QUOTA II for on-line program development in Cobol.

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Computer Centre

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Applications are invited for the post of Chief Programmer in the City of London Polytechnic. A large multi access DEC-10 system is installed providing interactive and sbatch facilities for its own staff and students, and a service for other Inner London Polytechnics. The configuration includes 256K main store, 200 mb of on line disk and a range of peripherals, and supports approximately 140 local and remote interactive terminals. The person appointed will report to the Computer Services Manager and will be responsible for implementation and maintenance of all manufacturer supplied systems software and development and enhancement of new and existing software. He/she will work with a team of 6 other programmers, oversee applications and monitor project assignments. Applicants will be preferred who have systems programming experience, a sound knowledge of DEC system 10's, a degree and/or professional qualifications in a relevant field.

A salary within the range £4816-£6843 per annum, starting point depending on experience and qualifications, is offered for this post.

Further particulars and application form may be obtained from the Staff Records Officer, City of London Polytechnic, 117/119 Houndsditch, London EC3A 7BU, quoting reference number 78/21.

C&L

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DP Consultancy

Computer professionals build their early career in a technical world where the emphasis is on the computer. If computer systems are to work, however, it is the people who use those systems who are important.

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Department of Computing Science
Research Associate

Applications are invited for post graduate studies starting from October 1979 for research in data bases, leading to a Ph.D. degree. One of the successful students will be expected to work in the area of PRECI a Portuguese and Relational Control Language with local interfaces, and the other in a joint data base project with ICL at Stevenage/Hatfield. Suitable applicants will be expected to have a first or upper second class honours degree in Computing Science or Mathematics and may be available for interview in London.

Any suitable graduate appointed may be eligible for a Research Assistantship at the University of Aberdeen following successful completion of a qualifying examination and appointment to a Lectureship. Further details can be obtained from Professor P. M. D. Gray, Department of Computing Science, King's College, Aberdeen AB9 2UB, Scotland, to whom applications should be sent by 1st May, 1979.

THE UNIVERSITY OF LANCASTER
COMPUTER SERVICES DEPARTMENT

SYSTEMS PROGRAMMER

The appointment is to initiate an EDP service for July 1979 on one installation under DME/GEORGE 4. The systems programmer will develop VME/K and 7/30S software to run in connection with the existing North West University Network. A degree or equivalent, experience necessary and a knowledge of large operating systems and/or communications should be an advantage, although graduates with an interest in computer based systems will be considered.

Salary on LA £5,883 - £6,669 under review)

Further particulars may be obtained quoting reference LT/CW from the Establishment Officer, University of Lancaster, Bailrigg, Lancaster, LA1 4YW to whom applications (five copies) should be sent within seven days of the date of this publication.

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Software Division
Staff Services Division of BOC Datasolve and a member of Computer Services Association

Knight

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Our small but busy ICL 2903 installation requires a young person with operating experience to fill a gap in our operations team. Knowledge of ICL utilities or JCL would be an advantage as it would the ability to work without supervision. We run two half shifts and you will be required to take responsibility for your section of the shift. Starting salary up to £3,500.

Contact: Mr. M. J. Ferry, Strongroom Management Services, Flex-Time House, 232 High Street, Waltham Cross, Hertfordshire. Telephone Waltham Cross 39787.

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Interviews can be held locally to suit YOU

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PROGRAMMERS (Honeywell + Lge. ICL 2900)	**£NEG**
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MIDLANDS — Ref: N21

SYSTEMS PROGRAMMERS (Univac and IBM/Mini)	**c £6K**
PROCESS CONTROL PROGRAMMERS (PDP/RSX11)	**£4K to £6K**
PROGRAMMERS (COBOL/PL/1/BASIC/BAL or PLAN)	**to £6K**
PROJECT LEADER	**£NEG**
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ANALYSTS (various)	**£5K to £6K**

SCOTLAND — Ref: N18

ANALYSTS (Burroughs + COBOL)	**£NEG**
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GREATER MANCHESTER — Ref: N22

PROGRAMMERS (COBOL on any machine — min. 6 mths. exp.)	**to £6K**
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PROCESS CONTROL PROGRAMMERS (CORAL)	**£NEG**
TRAINEE PROGRAMMERS (HND-TOPS-Degree etc.)	**£3½K+**

NORTH-WEST — Ref: N19

ANALYSTS (pref. financial + IBM)	**to £5600 + 5% Mortgage**
DEPUTY CHIEF PROG. (IBM COBOL/BAL/OS)	**£V. Good**
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PROGRAMMERS (1900 and/or 2970)	**£NEG**
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COMBYTE SERVICES LIMITED

MIDLANDS APPOINTMENTS

A small world—but big in opportunities

People usually associate the Midlands with thick Black Country accents, strikes and high quality workmanship. But DP people with a professional approach to their jobs can take their pick north of Bedford. PATRICK CONVEY, of the Birmingham-based Computer Personnel Consultants, here gives a full and frank view of the Midlands scene. But he warns that any job applicants must look right, speak clearly and be able to communicate ideas.

COMPUTING in the Midlands, or any other specific geographic area, is a smaller world than most of us imagine. Just how small may be illustrated by a rough breakdown of the available statistics.

It is estimated that only some 226,000 people are employed in computing in the UK. The proportion of those involved in development work, as opposed to operations, up to but not including DPM, is considered to be 60%, about 136,000 persons.

While there may well be no correlation between the geographic circulation of the trade Press and the total employed in a particular area, this should at least be a fair guide. Computer Weekly has a circulation in the greater Midlands of 13% of its total. This would give us a population of about 17,500 development staff.

If — and it's only a guess — 25% of the Midlands total were centred in the largest conurbation, Birmingham and Wolverhampton, there would be only just over 4,000 people involved in computer development work, in the area of greatest concentration.

When one takes into account the parameters of salary level, role and responsibility, hardware background and language and applications experience, it makes for a very tight, well defined market place.

There are other important factors to be considered when looking at the size of the market. It has been estimated that, due to inherent staff shortage, something like one in six posts are currently vacant. Additionally, development staff are said to be changing jobs at the rate of anything up to 25% a year. I suspect this figure may be an overestimation.

There is the suggestion that surveys are biased towards the larger installations of large organisations where the problem of turnover is particularly acute. It could also be that turnover in the provinces is less than in London as the job changer in the South East will have greater choice of vacancies within his commuting circle.

The market place, is, then, a very turbulent one. With this degree of staff shortage and high turnover, one would not expect a shortage of opportunities for career advancement. These opportunities do exist but not necessarily for all grades of staff. Some observations on the structure of the market may clarify this matter.

We may identify three distinct types of computer installation. In the first instance there is the classic large installation. This type invariably has a well defined career structure from trainee programmer to data processing manager with a wide variety of grades in between.

The second phase of installations has been best described as small mainframe, typical IBM System 3s and ICL 2903s. The introduction of this type of equipment brought with it a change in the general approach to staffing. Usually an existing employee of the company would be chosen from the accounts or stock office, would be trained in RPG II and appointed DPM.

The development programme often demanded a sharp peak and a low long-term need for staff. As a result a significant proportion of work was farmed out to software houses and the DPM recruited only one or two staff to fulfil an analyst/programmer role.

We are now well into the phase of minicomputers, Digital Equipment's PDPs, IBM System 32, 34, etc. The trend for a smaller number of less skilled in-house staff, which began with the small mainframe, has become more pronounced.

Computer development staff are not, of course, employed only by organisations directly using in-house hardware facilities. The service sector is rapidly growing and having increased impact.

Development skills are required in a support capacity, involving pre- and post-sales work, by both computer manufacturers and bureau organisations. Software houses continue to enjoy growth with work available often on both large mainframe and mini equipment.

The market area with perhaps the greatest potential is that of OEM dealers. As the cost of hardware decreases and new strata of potential users are exposed, this type of organisation is likely to enjoy rapid growth over the coming years.

Installations large and small are spread throughout the greater Midlands but are concentrated towards the two major conurbations of Birmingham/Wolverhampton and Leicester/Nottingham. There is some tendency for the larger installations which are based on major factories to be located at the edges of the large cities.

Let us then examine the opportunities, in general terms, for three basic categories of staff, ie the raw trainee, the senior man (at, say, project leader level) and the trained person with over two years' experience.

In spite of a recognised shortage of skilled staff the potential trainee will experience great difficulty in obtaining his first post. Training, in an organised way, is limited to the big installations of large organisations.

At the other end of the scale, senior staff are often locked into their present job. Data processing managers have little or no opportunity to progress.

Finally, for the individual in the middle range there are, of course, wide opportunities. Virtually all the large installations and many of the smaller ones have vacancies. The service companies are all constantly on the look-out for people who have two to five years' experience.

The importance of one's personal qualities cannot be overrated. The individual who combines basic skill with a high level of personal qualities can literally pick and choose from a variety of opportunities.

MAJOR NEW SYSTEMS LIMITED MOVE TO LEICESTER

On-Line Distributed Database

Our client, a high growth Group in the financial sector, already a major user of advanced data processing systems, has recently consolidated forward plans covering the next major development period.

In addition to the continued development of systems using a large mainframe a substantial distributed processing network using mini-computers is also to be developed.

To assist with the achievement of this ambitious plan our client is seeking high quality professional staff in the following categories.

PROJECT LEADERS to £7500

Candidates should have 4 to 5 years systems experience and must be able to demonstrate a record of solid achievement during this period.

This is a first class opportunity for those seeking a challenging position.

(CW 79015)

SYSTEMS ANALYSTS to £6750

Analysts at various levels of seniority are required. Candidates must have between 1 and 3 years systems experience in a professional environment. For all these positions a programming background would be considered an advantage.

(CW 79016)

PROGRAMMERS to £6750

Vacancies exist for programmers with a minimum of 12 months proven experience to senior programmers with not less than 3 years. The main language currently used is COBOL but the department will be introducing other languages.

(CW 79017)

Conditions of employment are excellent including a very good pension scheme and life insurance benefits. Assistance with relocation expenses will be offered where appropriate.

Contact Ivor Norton quoting the appropriate reference to arrange an early interview.

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SOUTH WALES

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We are currently developing Data Base Systems in Materials/Production Control and Sales areas and to assist in this work we are seeking candidates for the following positions:

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C. £5,000 p.a. + BONUS

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£3,560 p.a.

Applicants should be experienced COBOL programmers preferably with a knowledge of TOTAL Data Base and On-Line Programming Techniques.

Fringe Benefits for these appointments include those normally associated with a large progressive Company.

Applicants, either male or female, should write giving details of age, experience and current salary to:—

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Mr. A. C. Evans,
Personnel Manager
Fram Europe Limited,
Llantrisant,
Pontyclun,
Mid Glamorgan.

Career opportunities in Leicester-

with a major Region of today's energy industry

Our installation at EMGAS comprises a large Univac configuration supporting both batch and on-line systems and currently has a network of 124 terminals. Major development work is planned which will more than double the size of the network. We currently have the following vacancies which are open to both men and women:

DATA BASE MANAGER
up to £6774

To be responsible for the evaluation and testing of new DBMS software, the administration of file/database control and the pursuance of the Region's file management and database strategy.
Applicants should have had at least 5 years' data processing experience, of which 2 years must have been spent either in systems programming (file and data management software) or in system design on application projects. (Ref: A60/CW)

SYSTEMS ANALYSTS
up to £6237

Required to work within project teams engaged on the design, development, implementation and support of computer systems. Applicants should be able to analyse business situations, critically appraise results and produce solutions to the problems.
Applicants should have had at least 2 years' experience of programming and preferably some systems analysis experience. (Ref: A59/CW)

SYSTEMS PROGRAMMER
up to £5712

To work in the Software Section which is responsible for the maintenance and development of the Operating System, Compilers, Database and Real-time software.
Candidates should have at least 2 years' programming experience and be able to demonstrate an aptitude for software work.
Applicants with extensive relevant experience, including familiarity with Univac 1100 Series software, will be considered for appointment as Senior Systems Programmer carrying a salary rising to £6237* per annum. (Ref: A58/CW)

PROGRAMMING VACANCIES
up to £6237.

Experienced programming staff required to fill vacancies from a Programmer level up to Programming Group Leader. (Ref: A56/CW). The work entails both development and maintenance activities with career openings into other functions of the department. Structured programming techniques are in operation and the department is also evaluating the use of Database and associated software.
Two years' COBOL experience is required and experience of an Assembler language would be an advantage.

In addition to the salaries quoted, there is currently a self-financing productivity payment, plus the benefits normally associated with a large progressive organisation. Where appropriate, financial assistance with relocation expenses will be offered.

Detailed applications, quoting the appropriate reference number on both letter and envelope to: Industrial Relations Manager, Emgas, De Montfort Street, Leicester. Closing date: 30th March 1979.

EMGAS

MIDLANDS APPOINTMENTS

BIRMINGHAM

SENIOR PROGRAMMER
Salary to £6336

We are seeking someone with experience in developing mini based on-line systems to join a small team which is developing a national on-line network for libraries. Programming experience in any of the following languages is desirable: Assembler, Fortran or Basic. Training will be provided as required. 5 weeks holiday. Pleasant surroundings and extensive sports and canteen facilities.

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If you have five years' sound systems experience, or slightly less for the analyst position, you may be the person we are looking for. A degree or HND would give you a head start, but it is not essential if you have the right background.
It is unlikely that persons under the age of 25 will have had the necessary experience for these positions.

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Three Counties Business Supplies Limited

COMPUTER SYSTEMS MANAGER

We're Midland Poultry Holdings Limited, one of the larger poultry rearing and processing companies in the U.K., and part of the Unilever Concern.
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Now, to help us carry on, we're looking for a man or woman who will join our small, established and enthusiastic team as Computer Systems Manager.
He/she will be responsible to the Computer Services Manager for systems analysis work and associated programming and will have total involvement in computing from our hardware to the interface with all our management team. Currently we are using a PDP11 processor linked into an IBM mainframe, but our plans envisage upgrading our processors to support over 20 users.
Applicants for this post must therefore be experienced in IBM mainframe or mini computer programming and possess a sound knowledge of a high level programming language. But not just that — they should be able to carry a project through to conclusion and be keen and ambitious — the sort that will be looking toward a significant promotion with us, or within the Unilever Concern, in a couple of years.
On salary we are talking around £8,500 p.a. plus pension scheme incorporating life assurance, B.U.P.A. and of course assistance with removal expenses. We may even be able to help with short-term housing while you look around.
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John T. Bullock, Group Personnel Manager
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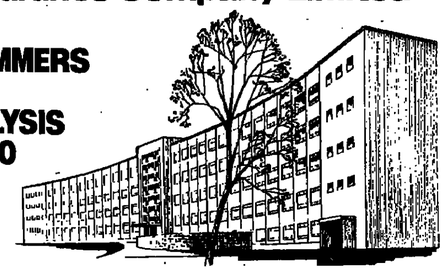

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Current equipment includes ICL 8950s, 1903A AND 2960 together with two Texas Instruments 990/10 computers.

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Experience of systems analysis, Cobol and George 2 would be advantageous but is not essential. PLAN experience is the only necessary requirement.

In addition to a competitive salary, we offer a subsidised mortgage scheme, free lunches and flexitime. Working conditions are first class and our offices are situated in most attractive surroundings which include our own private car parks.

PLEASE TELEPHONE OR WRITE FOR AN APPLICATION FORM TO:
MR. R. H. HADDLETON, DATA PROCESSING OFFICER,
BRITANNIC ASSURANCE COMPANY LIMITED, MOOR GREEN, MOSELEY, BIRMINGHAM B13 8QF
Tel. 021 449-4444

DATA PROCESSING MANAGER

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We have now decided to replace and extend the above facilities with a larger interactive in house system.
A Data Processing Manager is therefore required to initially work and liase with our consultants on this transition and subsequently accept the total responsibility for all future development of our systems.
This is a new Executive appointment in a private company and will be of interest to people of proven experience on the programming and analysis of both commercial and production systems. A working knowledge of an interactive mini-based system, although not essential, would be an added advantage.

Please write or telephone in the first instance for an application form to the:—

Personnel Manager, H. T. H. Peck (Holdings) Ltd.,
West Bridge, Leicester. LE3 5NR.
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Applications are invited for the above post from candidates possessing a good Honours Degree who have also undertaken research or had industrial experience in the application of computers in Information Systems.
The successful candidate will be expected to undertake teaching in this area at both undergraduate and post-graduate level and will also be expected to initiate research.
Duties to commence as soon as possible.
Initial salary with the range £3,883-£4,631 p.a. Superannuation.
Further particulars and application forms (returnable by March 30th) from the Registrar, The University, Manchester, M13 9PL.

Gwent (County Council)

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COMPUTER TECHNICIAN
Grade: T2/3 £3,279-£4,166
(including supplement)

The holder of this post will be a member of the Computer Section of the Highways Department. He/she will also provide assistance to engineers and technicians dealing with all aspects of the department's work.
The section makes use of the County Council's IBM 370/148 by visual display units and commercial computing facilities by terminal: Programmable calculators are also used.
Candidates for the above post should have a minimum ONC in a related subject and preference will be given to those with good experience in scientific or engineering computer applications.
Application forms may be obtained from the County Engineer & Surveyor, Highways Department, Victoria Street, Cwmbran. Tel. Cwmbran 2191 to be returned to the Personnel Section, County Hall, Cwmbran, Gwent NP44 2XH, not later than 6th April, 1979.

UNIVERSITY OF WARWICK

COMPUTING PROGRAMMER

Applications are invited for a programming post in the Data Processing Office to assist in maintaining and extending administrative computer systems. Interesting work will be provided on a newly installed system of Honeywell Series 2000/58. Salary on the other Related grade, i.e. £3,354-£3,804 pa. Applicants should be graduates or have an equivalent qualification. This would be a suitable position either for a graduate with some computer programming experience or someone seeking to obtain experience in the field. Further particulars may be obtained from the Secretary and Registrar, University of Warwick, Coventry (quoting Ref. No. 332/379). Closing date for receipt of applications 9th April, 1979.

Royal Doulton

Computer Programmer

The Management Services Department of Royal Doulton Tableware Limited are seeking an experienced COBOL programmer.
We are currently operating an ICL 1902T mainframe, with a variety of batch applications running under George 2, and a large on-line system with remote VT's and printers.
Expansion into distributed mini-computer based applications is planned and with this in mind we have just taken delivery of an NCR 8250 mini computer.
Applicants should have at least 3 years solid COBOL experience and appreciate the importance of a thorough approach to program design. Knowledge of ICL 1900 or NCR IMOS III COBOL would be advantageous.
Please apply in writing giving details of age, experience and qualifications to:-
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Royal Doulton Tableware
P.O. Box 100
London Road
Stoke-on-Trent
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We've just started a comprehensive expansion programme in hardware, systems, staff and new accommodation — WHY NOT EXPAND WITH US?

Senior Project Officer

c. £7,000

- Management of all development work for a particular project
- Undertake analysis and specification assignments for that project
- Assist the Project Manager in managing a team of approximately 10 systems and programming staff

The job requires 4 years' experience, including 2 years' systems analysis or a longer period as a computer system designer with some analysis experience.

Senior Programmer/ Analyst

(PLANNING DEPT. APPLICATIONS)

c. £6,500

- Analysis of all user requirements
- Responsibility for all design and programming aspects
- Advising on programming languages and packages
- Online program development facilities, accessing a large mainframe

The job requires at least 4 years' programming in FORTRAN and COBOL and including design and specification experience.

Operations Support Officer

c. £5,750

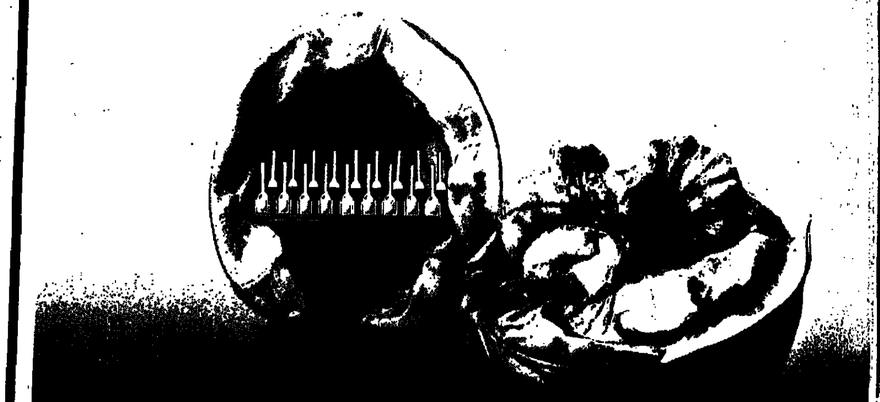
- Responsible for liaison with the Post Office on installing data transmission and related equipment
- Responsible for planning and implementation of terminals (remote and local) for new users
- Advising on use of data transmission equipment for maximum cost benefit
- Advising users on problems related to data transmission

The job requires a minimum of 4 years in an operations environment with at least 18 months' related experience of data transmission.

Other Benefits —
Wide range of relocation allowances, flexitime, restaurants, free car parking, staff club — bar, discos, squash, tennis, etc.

If you're interested write, with concise details of your career and experience, to Peter Brown, Computer Services Division, County Hall, Kingston-upon-Thames KT1 2DN.

SURREY COUNTY COUNCIL COMPUTER SERVICES



In a nutshell, isn't this what your computer career needs?

A couple of years ago you graduated and joined the computer industry.

Now, you're wondering what happens next.

One of the more exciting options open to you is to get yourself into microprocessors, with Marconi Avionics.

We'd train you in design techniques, and in CORAL. We'd give you an important programming or software engineering role in projects based on the latest microprocessor devices from the world's top manufacturers.

We reckon we've a lot to offer you, because in microprocessor applications, few companies in Europe have done or can do as much as us. We already use components like the Motorola 6800, the Texas 9900 and the Intersil 6100 both singly and in networks, on applications ranging from highly sophisticated security systems to airborne radars, from portable radars to sonar systems. One thing all our projects have in common is a need for creative technical thinking of a high order, both on software and hardware tasks.

All we ask of you is a degree in a relevant discipline. A couple of years in virtually any area of computing, hardware or software, but with the emphasis on technology. And most of all, the kind of creative intelligence that's at home in an environment such as ours.

If you phone H. E. Batchelder on 01-953 2030, ext. 3410 we'll put you through to someone who can tell you exactly what roles you could play in microprocessor systems development with us.

Technical challenge, involvement, and a completely new direction in your career. In a nutshell, isn't that what you're looking for?

Marconi Avionics Limited,
Elstree Way, Borehamwood, Herts.
Please quote reference MA 79026.

MARCONI AVIONICS
A GEC-Marconi Electronics Company

FIELD SERVICE ENGINEER

New Career — Start £6,500
(Plus Quality Car Choice + Free BUPA + Relocation)

One of the world's leading micro computer manufacturers currently enjoying an annual growth rate of 40% is about to launch its own service group. This new venture could be you opportunity to join a dynamic company, gain experience in wide range of industries and applications with prestige products. Start at £6,500, plus £4,600 towards the car of your choice plus many other benefits. If you are a service/customer engineer with good academic background/computer experience, live in London or Home Counties, then take a big stride to an exciting new career with excellent future prospects by calling today — but hurry!!

Consultant's Ref: EK2137

AB EXECUTIVE (KINGSTON) LTD. 01-549 6442

INTERNATIONAL BANK CITY PDP11 OPERATOR

An additional computer operator is required to operate our PDP11/70 configuration running on-line and Batch applications under AIMS5 operating system.

Applicants are expected to have at least 2 years mini experience preferably DEC equipment but not essential as full training will be given.

We can offer a high salary with excellent fringe benefits to the right person.

Please apply in the first instance to: John Watkins. Tel: 01-588 3861 Ext. 208.

THE UNIVERSITY OF LEEDS
DEPARTMENT OF COMPUTER STUDIES

Applications are invited from suitably qualified candidates for two posts of

LECTURER

in the above Department, with special interests — one in Data Processing and the other in Micro-technology. The Department provides a Student Computing Service to university departments through a large DEC System 10.

Salary on the scale for lecturers £3883-£7754 (under review), according to age, qualifications and experience.

Application forms and further particulars may be obtained from the Registrar, The University, Leeds LS2 9JT, quoting reference number 4B/15/AZ. Closing date for applications 30th April, 1979.

WE'RE REALLY GOING PLACES! ARE YOU? PROGRAMMERS OPERATORS
For Manchester
01-881 3060

SITUATION WANTED

On West Coast of America, for Systems Programmer with 4 years' experience of OS/VS1, CICS, Assembler, IBM 370/168. Currently employed within insurance field. Please reply to: J.R. Reed, P.O. Box 42273, Fords-burg 4029, Johannesburg, South Africa 2011.

SERVICE ENGINEER
COMPUTER TERMINALS AND PERIPHERALS
WEST MOLESEY, SURREY

We are seeking Service Engineers to maintain and repair a wide range of computer terminals and peripherals.

Applicants should have experience in servicing TTL, CMOS and Micro based printers, displays, floppy disc drives, data concentrators and paper tape equipment. Experience of IBM 3270 type systems will be especially of interest.

If you are interested in working for a lively expanding young company, in return for a generous salary, the use of a company car and other fringe benefits, please write or telephone:

David Robson, Peripheral Hardware Ltd.
Armfield Close, West Molesey, Surrey.
Tel: 01-941 4806

See our advert on Page 4

MYRIAD

RPG II PROFESSIONALS

N.W. LONDON **c.£7500**

Our client, a well known and extremely successful organisation in both the UK and Europe have recently upgraded their hardware to an IBM System/3 15D with 25K memory.

With the introduction of the new machine it is now planned to develop on-line applications to serve the entire groups computing facilities.

Both ANALYST/PROGRAMMERS and PROGRAMMERS are required to join a small professional team where they will have the opportunity of gaining more advanced technical experience and the responsibility of leading teams on some of the smaller projects.

Successful candidates should be skilled professionals in the use of RPG II and capable of liaising with user departments in order to determine their exact needs on some unusual and exciting applications.

For these people seeking a challenging and progressive career the company offers an excellent salary and other significant company benefits.

Ref. N1/2203.

LEAD PROGRAMMER

BERKS/BUCKS BORDER **To £6000**

We are seeking an IBM programmer with a minimum of two years' experience of COBOL. Ideally you will be keen to lead a small programming team and gain indepth technical involvement in real-time programming with database and communications applications. Extensive training in software will be given and the opportunity to develop your career into either analysis or alternatively database and software design are very real possibilities.

The company, a well established engineering concern, is currently developing a broad range of on-line real-time applications in a project oriented environment. These positions both offer considerable career potential with a company committed to technical development of computer personnel. Relocation assistance, five weeks holiday and an excellent staff canteen together with a busy professional working environment make this an excellent career opportunity.

Ref. E2/2203

SYSTEMS ANALYST

MIDDLESEX **TO £8000**

Seeking to retain their successful edge in the competitive retail industry our client requires a competent SYSTEMS ANALYST to provide the experience necessary for successfully implementing new systems.

The company is experiencing a dynamic growth through the prudent marketing of its product range and now needs additional professionals to support the comprehensive range of development planned for the near future.

Using the latest Data Processing techniques for Retail and Warehouse Stock recording, this is an ideal opportunity to extend one's knowledge and experience of Database systems.

Applicants must be able to demonstrate a successful record of project planning and implementation and ideally support these achievements with a strong COBOL background.

Apart from an excellent salary, the company also offer a bonus, pension and life assurance schemes and a very pleasant working environment.

N2/2203

SYSTEMS & PROGRAMMING CONSULTANCY

PROGRAMMERS LONDON/BUCKS **To £6750**
SYSTEMS ANALYSTS **To £8000**

Join this dynamic systems house currently in a phase of controlled growth. Opportunities to gain experience with a variety of machines and systems makes this an ideal move in the career path of programmers and analysts with 2-3 YEARS' commercial D.P. experience.

If you would like to sample several different installations and receive a sound training in professional systems consultancy, this Company offers attractive terms of employment with projects throughout London and the Home Counties.

In addition the Company has a busy turnkey projects division based in Buckinghamshire, offering in-house software development opportunities. If you have experience of small machines, Hewlett Packard or Data General in particular then these positions offer generous rewards.

Ref. E1/2203.

MYRIAD APPOINTMENTS LIMITED
30 Fleet Street London EC4Y 1AA
01-353 0981 24 HRS.

Manager

Military Software Section

GEC Computers Limited, Europe's largest and most experienced company specialising in real-time computer applications, require a Manager to set up and run a specialised Military Software Section.

This presents the right person with an exciting opportunity to use flair and imagination in setting up the new section from scratch. The initial task will be the recruitment of appropriate personnel; thereafter, the Manager will be responsible for the continued operation and development of the section, including meetings and discussions with representatives of military or defence customers on projects having a software content.

A degree or equivalent in a relevant discipline is required, together with a minimum of 5 years' software experience — preferably with a knowledge of CORAL. Experience in dealing with military customers would be an asset, but is not essential.

Contact: **Graham Ince, PER., 56 Park Street Luton, Luton, Beds. Tel: Luton 417562. After hours answering service: Luton 413164**

PER Professional & Executive Recruitment

Applications are welcome from both men and women

SOUTH DERBYSHIRE DISTRICT COUNCIL

If you have at least 2 years' COBOL experience and feel your talents could be better employed by a move into systems design? If so, you may be the person we are looking for as:

PROGRAMMER/ANALYST

£3,732-£4,632

The Council is awaiting delivery of the very latest Honeywell Level 62 technology with 320K memory and 3 x 80 mb discs to take its present 61/60. The successful applicant will be a member of a team engaged initially on conversion to the new machine and thereafter will play an important role in developing new systems.

The Council's offices, which by early summer, will be situated in a new purpose built block, are in Swadlincote a small town close to the Midlands motorway network and the cities of Derby, Leicester, Nottingham and Birmingham but within easy reach of such scenic attractions as the Peak District.

In addition to a salary within the above range the Council offers an attractive relocation package. For further details and application form telephone Mr. A. G. Meekings on Burton-on-Trent (0283) 221000, or write to The Treasurer, Council Offices, Midland Road, Swadlincote, Burton-on-Trent DE11 0AH.

Closing date for applications: 29th March, 1979.

UCC SOFTWARE PRODUCTS INTERNATIONAL

University Computing Company is a supplier of some of the world's leading operating software systems. These products, including UCC TWO (DOS under OS) and UCC ONE (Tape Management Software), consistently appear in the Datapro Roll of Honour and are used in over 2,000 IBM installations throughout the world.
Due to continuing expansion UCC needs more people to provide technical support.

Software products Technical support

Up to £7,500

Responsibilities will include:

- Technical pre and post-sales back-up to our clients and sales team.
- Technical training to salesmen.
- Presenting our products to user groups and workshops.
- Installing products where necessary.

Successful applicants could already be working in a sales/technical support role or have 1-2 years' experience in OS systems programming, with a knowledge of Assembler language.
They should enjoy dealing with people in a sales/technical environment and be self-starters.
Although based in Norbury, there will be opportunities for occasional travel in Europe and the U.S.
In addition to four weeks' holiday, other benefits include season ticket loan scheme, subsidised restaurant and regular salary reviews. Removal assistance is available where appropriate.

Interested?

Then write or telephone: Peter Pryke.

UCC UNIVERSITY COMPUTING COMPANY
UCC Software Products International
1268 London Road, Norbury, London SW16 4XN. Tel: 01-679 4866

Software Programmer

BRITISH AEROSPACE – KINGSTON

Due to continuing expansion within the SYSTEMS DEPARTMENT, we have a vacancy for a SOFTWARE PROGRAMMER with mini experience.

The Department currently operates an ICL 1906S–384K, under George 3. An ICL 2960 and a range of mini-computers are used for new systems development.

The requirement is for a SOFTWARE PROGRAMMER with at least one years' experience to work on development of a network of minis, communicating with mainframes.

The successful candidate is likely to have the following:

- Programming experience on a mini (high-level language or assembler), preferably PDP-11 or VAX-11 under standard operating systems.
- A relevant degree or professional qualification.
- The ability to communicate with management, users and engineers.

This is a responsible position offering an attractive salary based on experience, and ample opportunities for career advancement. In addition the Corporation offers a Pension and Life Assurance Scheme, a Sports and Social Club (Squash, Football, Sailing, Licensed Bar etc.), excellent canteen facilities and, where appropriate, generous assistance with relocation expenses.

Please write with brief essential details of telephone for an application form quoting TW/45 to:
The Personnel Officer,
BRITISH AEROSPACE, Aircraft Group,
Kingston Branch Division,
Richmond Road,
Kingston upon Thames, Surrey KT2 5QS.
Telephone: 01-546 7749 (24 hrs. ans. service)

BRITISH AEROSPACE AIRCRAFT GROUP

REAL TIME SYSTEMS DESIGNERS & PROGRAMMERS

to unscramble the rush hour in Sao Paulo—among other things

Our computer controlled urban traffic schemes play an important part in city life throughout the world — from London to Sao Paulo in Brazil.

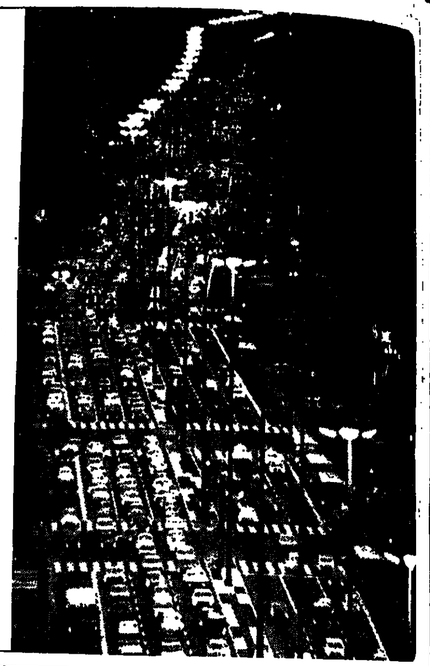
In data communications, our SPC Telex systems daily transmit thousands of messages around the globe. We are introducing the first full packet switching service into the UK and will shortly exploit its international potential.

When you join our teams of professional engineers at Poole, working on a range of exciting new projects in several fields, you will see total projects through from conception to completion. Projects involve sophisticated real time programming techniques using DEC, PDP11 and GA mini computers. There are outstanding opportunities to gain valuable experience and to develop your career.

Starting salaries range up to £8,000 p.a. and generous relocation expenses to the Dorset coast will be offered.

Ring Poole (020 13) 5161 extension 2028 reversing charges to arrange an appointment for an informal discussion. Alternatively, write with brief career details and present salary to J. G. Griffiths, Recruitment Manager, Plessey Controls Limited, Sopers Lane, Poole, Dorset BH17 7ER.

PLESSEY



DESKILLED?

If you think most systems jobs have been deskilled until all the fun has gone out of them—you'll find us very different.

Bunzl Data Systems are a house with a fast-growing name for problem solving. The Technical Software Department has a wide brief, from customer support for the writing of micro-computer software, to the design of special hardware, systems development, and trouble-shooting. With a small but growing team, this means nobody is stuck doing just one thing.

Current needs are firstly for a real professional, ready to make his/her major contribution to the state of the art—and to develop himself/herself, while developing micro-processor small business systems. Must know two Assembler and one, preferably two, high level languages.

We also need another paragon, certainly still learning, but with in-depth training and a minimum of three years' experience on DEC machines. Primary task would be to write custom software for micros to drive sensor I/O devices. This will demand a very precise understanding of both machines and language.

Both positions pay over the market rate for much above average ability and carry the benefits you would expect.

If you are really good and you want to start your skills growing again, telephone Sue Holliman on Little Chalfont (02404) 4466, and set up an appointment to talk to us.

BUNZL DATA SYSTEMS
– a subsidiary of the BUNZL Pulp and Paper Group

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PROGRAMMERS & ANALYSTS

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Rapidly expanding COM Bureau has vacancies for experienced and trainee

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Technical Support Staff are responsible for testing, implementing and maintaining software on sophisticated COM Recorders for Client applications (105mm Microfiche and 16mm Microfilm) and assisting in pre-sales situations.

Operations staff work a four shift system and are responsible for the production of high quality COM output within specified turnround times for the Client base.

Attractive salary and benefits are offered commensurate with age, ability and experience.

Please apply in writing with personal and career details to:

Mr. A. H. Bates
Technical Services Manager
COM Services Division
Financial Data Services Limited
6 Salem Road
London W2 4BU
or telephone 01-229 9431 for an application form

EAST SUSSEX COUNTY COUNCIL
HIGHWAYS & TRANSPORTATION DEPARTMENT

ANALYST/ PROGRAMMER
£3722–£6060
(Inclusive of National Supplement)

Graduate in a numerate discipline is required to join a small team providing computer support for the work of the Department. He/she will have particular responsibility for traffic and transportation work and must have knowledge of transportation planning and FORTRAN programming. Experience of ICL 1900 machines and the George 3 operating system would be an advantage. The starting salary will depend on level of good practical experience of computer support for transportation planning.

The authority currently operates a 1972 ICL 1904S (due to be replaced by an ICL 2972 in mid-1980) and the Department has access to that machine by means of video terminals and a remote line printer; computer graphics also play an important part in the work of the Department.

Application forms and further details from the County Engineer, Phoenix Causeway, Lewes (Tel: 0400 Ext. 127/238).

Closing date: 9th April, 1979.

Berkshire Education Committee

LANGLEY COLLEGE OF FURTHER EDUCATION
LECTURER I IN DATA PROCESSING

Applications are invited for the above post commencing on 1st September, 1979.

Applicants should possess a degree or equivalent qualification and be able to teach Data Processing to BEC National level. An interest in helping with Computer Science would be an advantage.

Salary Scale (under review) £3342–£4484.

Berkshire has a scheme for assisting with removal expenses.

Further information and application forms from:

The Principal, Langley College of Further Education, Station Road, Langley, Slough SL3 8BY. Please enclose a stamped, addressed foolscap envelope.

Closing date 20th April, 1979.

I.M.S. PROFESSIONALS FOR U.S.A. & HOLLAND

YOUR CHOICE

RENDECK is an established international group of Software houses operating in Netherlands, United States and United Kingdom.
The Dutch Company, based in Amsterdam, is involved in various aspects of the computer industry — consultancy and product development, software marketing and support, and hardware marketing and support. We are at present looking for IMS professionals wishing to work on a variety of projects in the Amsterdam Area.

The American Company, with its head office in Boston, is mainly concerned with the development of large teleprocessing and database projects. Requirements exist for all levels of staff in different locations throughout the States, especially on the West Coast.

YOUR SKILLS

We are interested in meeting IMS personnel from all levels within the industry ranging from programmers through to systems designers. You will need an in-depth knowledge of IMS (at least three years' experience) within the commercial sphere of applications and a willingness to be part of a dynamic team of computer professionals.

YOUR REWARDS

As well as the opportunity to develop your career within a fast growing international environment you will receive above average salaries, good expenses, medical and social benefit insurance in the U.S.A., return air flights for you and your family, plus many other benefits that you would associate with this type of appointment.

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Urgently required for Trainee positions. Industrial scientific and Commercial situations
SALARIES c. £3,000
ALL AREAS
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University of Wales
UNIVERSITY COLLEGE OF SWANSEA

Applications Programmer
(Readvertisement)

Applications are invited for the post of **Applications Programmer** in the **College's Computer Centre.** The Centre provides a service to the College based on an ICL 1904S which is also linked to the ICL 1904S/CPC 7600 system at the University of Manchester Regional Computer Centre. Applicants, who should have a degree or equivalent qualification, will be responsible for maintenance and development of operating system programs and will also be expected to take part in the delivery and maintenance service to users. Experience in graphics, numerical analysis or the use of real-time processes would be an advantage.

The salary will be on the scale £4,064–£7,604 per annum (under review) plus £1,176 (London) or £1,000 (elsewhere) per annum threshold payment.

Further particulars and application forms (2 copies) may be obtained from the Personnel Officer, University College of Swansea, Singleton Park, Swansea SA2 8PP, to whom they should be returned by Friday, March 30, 1979.

PROGRAMMER TEST TECHNICIAN

Prefer the countryside? Then make your move with us to our new premises near Crawley — close to the M23. Being a small, rapidly expanding company, you have the chance of growing with us and creating your own opportunities for progress. You will be working on varied and unusual microprocessor applications in a pleasant, informal and creative atmosphere. You might even enjoy it!

01-941 3010.
ELAN DIGITAL SYSTEMS LTD.

DATA CONTROL CLERK
TOOTING — £3,800

Progressive position in a large ICL 1900 Computer Centre, located in a S.W. London Hospital. GEORGE 3 job control experience is preferred. Internal training is provided for this post which is on a two-shift system.

TRAINEES also considered

Telephone for an application form.
Janet Golding — 01-672 9988

Computer Services Manager
c. £7,000

G. A. Harvey Office Furniture Ltd. is part of the Bunzfield-Harvey Group and has recently consolidated its production facilities and office on the outskirts of Margate. The opportunity has been taken to revise its bureau based computer processing and RJE terminals will shortly be installed. There is an ambitious program to extend the use of computer processing for order entry, production and stock control and management information. In time, an in-house computer will be installed.

A manager, reporting to the Finance Director, is required to control the bureau operation and associated office procedures, and to assist the Company in its development of computer based systems. The position will appeal to someone who has played a major role in implementing a successful computer application including involvement in clerical support systems, and who now wants to manage and develop a computer utility. This is a key position with great scope and applicants, male or female, must be able to demonstrate management potential over and above mere technical competence.

The salary is negotiable and relocation expenses will be paid if the manager wishes to move to this attractive part of Kent which is close to several resorts and with good connections to London.

Please send adequate particulars, in confidence, to P. R. Billinghurst of:–

Spicer and Pegler
Management Consultants,
3 Bevis Marks,
London EC3A 7HL.

DE HAVILLAND COLLEGE
The Campus
Welwyn Garden City, Herts.
DEPARTMENT OF COMPUTER STUDIES

LECTURER GRADE II

required from 1st September, 1979 to teach Computer Science and other computing topics, mainly based in Welwyn Garden City. Applicants should have a good honours degree and teacher training.

LECTURER I

Computer Operations required as soon as possible, based at Elstree (very convenient for M1 motorway). Applicants are invited from suitably qualified and experienced persons who will have considerable practical experience on one or more of the following: Telecom Tracking.

At the present time the Department is developing courses in Computer Science and Computer Studies at Higher National Certificate and Diploma level and is also responsible for a number of part-time courses for industry.

Application forms and further details may be obtained from the Personnel Officer, De Havilland College, The Campus, Welwyn Garden City, Herts. AL8 6NU. Telephone Welwyn Garden City 28444 (STD 07073).

Closing date: 2nd April 1979.

SOUTH NORFOLK District Council

Computer Programmer

Salary £3399–£4146 p.a. inclusive

- Our small and enthusiastic 2903 Computer Department requires a Programmer with two or more years' experience on a 1900/2903 Computer (preferably RPG 2) to work on batch and on-line development in financial and non-financial fields.
- The Council has just moved into newly completed and modern offices, with a purpose built computer room, in delightful rural surroundings.
- Starting salary according to experience and removal/disturbance allowances up to £500 will be paid.
- Temporary housing accommodation can also be made available in appropriate circumstances.

Full details and application forms obtainable from Management Services and Personnel Officer, South Norfolk House, Swan Lane, Long Stratton, Norwich NR15 2XE.

Closing date: 2nd April 1979.

SERVICE ENGINEERS

NEW CAREER
CIRCA £6,500 + Car

A new company (secure European backing) has introduced unique Micro based computer in the U.K., and requires a bright young computer Service/Customer Engineer to set up a service facility from scratch. You will visit Holland for all product training, enjoy lots of personal contacts, academic background computer experience, can communicate, then take a big stride forward to a really exciting new career with excellent future prospects.

Start circa £6,500 plus car plus expenses. Call now. Ref. E.K. 2144.

A. B. EXECUTIVE LTD.
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JOHNSON GROUP CLEANERS LTD.
require a
COMPUTER OPERATOR

An opportunity has arisen due to the introduction of two-shift working, for a senior operator with three years' plus experience of I.C.L. 2903/4 or 1900 machines. If you have a good knowledge of I.C.L. utilities and feel you could handle a shift on our rapidly expanding 2903, then we want to hear from you. SALARY CIRCA £3800.

Contact: Mr. L. P. Clarke, Johnson Group Management Services, Mildmay Road, Bootle, L20 8AW. Tel: 051-933 8181, ext. 244.

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Challenge!

For details and brochure write to Computer Careers in Australia Agent-General for Victoria, Victoria House, Strand, London WC2B 4LG.

CLASSIFIED COPY All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring David Abbey for further details on 01-281 3016.

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Our clients are keen to meet men and women aged 20 to 40 years, with potential earnings of between £4,000 and £8,000 p.a.

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Address

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London W1N 9HA.
Tel: 01-491 4636
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OPERATIONS MANAGER
JERSEY

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COMPUTER EQUIPMENT: NCR 151 operation under B3. Plans to upgrade to Criterion Links within Jersey and to the U.K. and soon to our New York office.

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—Thorough knowledge of B3 and NCR software.

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Apply in writing, giving full details of career to date and current salary, to Ian Thomas, Computer Patent Annuities, Union House, Union Street, St. Helier, Jersey, C.I.

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A vacancy exists for a System Support Engineer, male or female, for the FM1600D and FM1600E systems with ancillary equipment to be permanently based at **CWMBRAN COMPUTER CENTRE.**

Duties include:

(a) Diagnosing and rectifying hardware/software problems related to the above systems.
(b) Setting to work and incorporating approved modifications to the existing computer systems.
(c) Ensuring that the existing system scheduled maintenance procedures are adhered to.
(d) Guidance and training of junior staff.
(e) Assisting with preparation and proving of system documentation.

Qualifications:

(a) To have detailed knowledge and experience in fault finding on one of the above systems.
(b) To have proven ability to investigate hardware/software system problems.
(c) To be fluent in the use of standard logic diagrams, circuiting and specifications.

Ferranti offers a progressive salary structure, a productivity bonus scheme and flexible working hours; catering and recreational facilities are in operation.

If you are interested please ring our Recruitment Office on Bracknell 3232, ext.471, or write quoting ref. no. CB/3/CW to:
Personnel Officer, Ferranti Computer Systems Limited, (Bracknell Division), Western Road, Bracknell, Berkshire.

FERRANTI
Computer Systems

THE UNIVERSITY OF ASTON IN BIRMINGHAM

COMPUTER OPERATION

Applications are invited for the post of Computer Operator in the University's Computer Centre. The Computer Centre currently operates a three shift system from 0700 hours Monday to 0700 hours on Saturday. Salary within Computer Operator Scale (£2647-£3389 per annum.

Application forms and further details from M. A. C. Rees, Staffing Department, The University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET, quoting reference number O/171/CW.

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With relevant expertise (not just experience) in:
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MIDLOTHIAN DISTRICT COUNCIL
COMPUTER MANAGER

£8,522-£7,611 (inclusive of Supplement)

The District Council operate an I.C.L. 2903 Computer with 24K words main store and 3 disc drives. All input is currently via D.E. key stations. The installation is already processing several financial applications which are batch systems programmed in COBOL and RPG.

It is intended to develop further financial and management information applications extending over all services provided by the Council. This new post has been created to co-ordinate the planning and implementation of future applications and hardware enhancements. The successful applicant will also be responsible for the day-to-day management of the Data Processing Unit, including the existing staff of six persons, and will report directly to the Depute Director of Finance.

Applicants should have widely based experience in Data Processing and proven management ability. An appropriate qualification would be an advantage but is not considered essential.

The District Council work a 35 hour week, with no shift working. A generous scheme of assistance with relocation expenses is available.

Application forms are obtainable from the Personnel Officer, Midlothian District Council, 1 Eskdaill Court, Dalkeith, Telephone Number, 031-663 2881, Ext. 273, to whom they should be returned by 28th March, 1979.

RPG II PROGRAMMER

SOUTH COAST

Our client company, Searle Manufacturing Co. Ltd., a major manufacturer of air conditioning and refrigeration equipment, currently wish to recruit an RPG II Programmer. Their current hardware environment comprises an IBM System 32 with 24K memory running under OCL/SCP.

Reporting to the Company Systems Coordinator, the suitable applicant will be required to have a sound knowledge of RPG II. Some previous systems involvement would be an advantage. Initially the selected candidates duties will be the coding, compiling and testing of new programs and amendments to existing programs.

The factory is situated in Fareham, pleasantly located on the Solent within easy distance of the major centre of Southampton and the Hampshire New Forest. An attractive salary with staff benefits package and assistance with relocation expenses where appropriate.

Applications for this position will only be considered through Sanderson Executive; for further information please phone or write to Mike Beesley.

Sanderson 56 Princess Victoria Street Clifton Bristol
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Due to the increasing number and complexity of projects both in hand and imminent, our Research Centre at Abingdon – which specialises in fuels, lubricants, and additives – needs a technically-minded and creative man or woman to join a small team providing an efficient and flexible computing service for our scientists and technicians.

Using the Centre's multi-terminal interactive PDP 11 System linked to the worldwide Exxon IBM 370 network this team is responsible for all aspects of computer application and development arising from projects under investigation, including the use of mini computers in data logging and real-time applications.

With a degree in Maths, Statistics, Chemistry, Electronics, Chemical Engineering or an associated discipline, you must be able to appreciate the scientific problems encountered in our research – logically thinking them through to provide cost effective computer solutions.

At least one or two years' practical experience with systems or software is essential – preferably in a scientific environment. A statistical background would also be an advantage.

A competitive salary will be supplemented by a full range of benefits, and generous relocation assistance to this attractive rural area – just an hour away from London and only 20 minutes from Oxford – will be provided where appropriate.

Please write with full details, to: D.P. Sweeney, Employee Relations Service, Esso Research Centre, Abingdon, Oxon OX13 6AE.
Or phone him on: 0235 21600.

ESSO

BOLSOVER DISTRICT COUNCIL
FINANCE DEPARTMENT
SENIOR SYSTEMS ANALYST/ PROGRAMMER

(Based at Mansfield)

Grade AP.5 Salary £4,773 to £5,073 (Inc. supplement)

The Authority will be installing a Nixdorf 8870/6 computer in August 1979 to replace its existing computer. When the present conversion of systems is completed an extensive programme of development of on-line systems is planned.

The Council require a Senior Systems Analyst/Programmer to participate in this development programme and the applicants should have experience in the design, programming and implementation of both financial and non-financial applications. Experience in the use of Cobol is essential and training will be given in the use of Nixdorf software.

Full removal expenses will be paid and temporary housing accommodation will be considered in appropriate cases.

Closing date: 28th March, 1979

Further details/application forms obtainable from:

Personnel Department
100 Chesterfield Road South
Mansfield, Notts.

THE UNIVERSITY OF ASTON IN BIRMINGHAM

PROJECT PROGRAMMER

A vacancy exists in a research group which is constructing a bibliographic information system in conjunction with the Biodeterioration Information Centre in the University. The project involves a variety of programming work, including the production of computer type-set output, software for a microprocessor-controlled data entry device, and the implementation of sophisticated information retrieval algorithms. This post is for a period of eighteen months only, in the first instance. Applicants should be graduates with a good working knowledge of at least one high-level language, and preferably some experience of assembly-level programming. Salary within Research & Analogous Staff £3814 - £5883. Application forms and further details to Mr. A.C.J. Rees, Staffing Department, quoting reference number O/171/CW.

The University of Aston in Birmingham
Gosta Green
Birmingham B4 7ET

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All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring David Abbey for further details on 01-261 8016.

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FASHION TO FINANCE

The work of our Small Business Systems Group is computing at its most satisfying. Take, for example, the Group's Garment Manufacturers System, a hardware/software package for an industry with problems you wouldn't believe. It's a total system—which integrates stock and production control, documentation, and accounting — designed for hands-on operation by existing staff. But from identifying the need to completion of the package took just six months—and it's the neatest piece of system design and programming you're ever likely to see.

The Small Business Systems Group supports the IBM Systems 32, 34, 38, and 5110 with both tailor-made systems and industry-specialised packages. Success in this area has created a number of exciting opportunities for programmers and analysts with experience of RPG11 or BASIC who want variety, responsibility, and opportunity in their careers.

Your job will be to make a significant personal contribution to the design and programming of these systems through your professional skills. You will rapidly gain wide experience of many applications in a range of user areas from the garment industry to some of the most specialised areas of the City. You will have the opportunity to promote your own ideas for product improvement and new products. You will gain valuable experience of direct client contact. And you will have the chance of using a powerful set of programming aids and to contribute to their improvement.

Software Sciences is a European leader in software and systems so offers the career opportunities, rewards, and corporate backing to be expected at the top of the industry. At the same time we place a special emphasis on the product approach to industry-specialised hardware/software packaged systems and our work in this area is concentrated in our London office.

All that makes the Small Business Systems Group the right place to be at the right time if you are looking for the ideal combination of personal motivation and job satisfaction in a career minded company.

If you would like to join in the early days of the small business boom please send your c.v. to Sarah Chambers at our Farnborough Head Office or telephone or write for an application form. Interviews will be held in London. If you would prefer to discuss these vacancies informally first, then please telephone Peter Hatt, Manager of the Small Business Systems Group, at our London office (01 405 5993).

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If that sounds like the opportunity you are looking for then please send your C.V. to Sarah Chambers, at the Group's Farnborough head office, or contact her by letter or telephone for an application form.

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The continuing success of the Software Sciences Group has created a variety of openings for career-minded designers and programmers. They include opportunities in both the mainstream of company activities and the exciting new area of microprocessor applications.

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With a Group as diverse as Software Sciences there is likely to be an opening whatever your qualifications, but we are particularly looking for mini experience in either commercial or high reliability real-time applications. Your hardware background may be on DEC, Data General, Ferranti, Burroughs, or GEC; and you should have a comprehensive knowledge of one or more of Coral, RTL2, Assembler, Basic, Basic +, or Argus or Burroughs software.

Microprocessor systems

Software Sciences has been at the forefront of the microprocessor revolution and has already successfully applied this new technology to a number of major projects including currency exchange, point of sale terminals, and the UK bookshop Teleordering system. We believe that our commitment to this area is second to none in the UK software industry, and even the United States is buying our application expertise in this field.

In Software Sciences Micrologic we have a total 'design and build' capability for the application of microprocessors. This creates exceptional prospects for programmers and designers who can contribute to our growth in this area. Vacancies are in Bedford and there are opportunities to develop your career in a number of ways, from microprocessor software specialisation to a variety of management roles.

Designers and Programmers for Bedford, Farnborough or Macclesfield

If you are interested in any of these vacancies please send your c.v. to Sarah Chambers at our Farnborough head office, indicating your preference. Alternatively, you may contact her by telephone or letter for an application form.

Software Sciences Limited
(Head Office) Abbey House 282/292 Farnborough Road Farnborough Hampshire GU14 7NB Telephone 0252 44321

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Software development expertise is now required to assist with engineering/electronic/scientific systems on mainly DEC PDP 11 equipment operating under DOS or RSX11M.

Other mini and micro machines are also utilised and the company has facilities for assembling systems hardware to investigate inter-face problems using simulated inputs. Test rigs are constructured and back-up experiments carried out 'in-house' to ensure smooth operational running.

Knowledge of a low-level language is essential for these positions and a relevant qualification (e.g. engineering/physics/ mathematics) will be an asset.

Fortran programmers will also be of interest as many projects include mathematical modelling.

Salaries will be commensurate with experience but should not prove a problem to persons wishing to join the company.

Situated in the attractive countryside of Surrey, our client is a highly profitable and successful business, expanding rapidly in Great Britain and overseas. Modern offices are well serviced by three British Rail stations (easy access to the West End of London) and there is a large car-park next to the building.

Ref. S1/2203

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To the suitably qual. person, we offer a progressive computing environment with on-line programming facilities and work on a wide range of applications and services, both already on the computer and in our future development plans. Opportunities exist for subsequent career progression in application programming, technical support or systems analysis. The Authority currently operates under George 3 on ICL 1904S with 192K store and in September 1979 will be taking delivery of a 2960/72 system operating under DME and VME/B.

35-hour week with flexible working hours; 22 days annual leave rising to 26) plus 10 statutory days; staff restaurant; season ticket scheme.

Implementation Officer
£4,680-£5,067 inclusive

Implementation Officers are responsible for producing user-department Systems Manuals and for training user-department staff to understand and work with computer systems. Applicants should have plenty of commonsense, a practical approach, and the ability to write in a clear-but-chatty manner and deal with staff at all levels.

We're looking for someone with experience of computer systems or, who feels that with suitable training they would be capable of undertaking this interesting work. Opportunities for subsequent career progression in systems analysis, operations control and administration.

Please send applications for both posts by 23 March, stating age, qualifications and career details to date, to: Computer Services Manager, Town Hall, London SW18 2PU.

LONDON BOROUGH OF
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or

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Tel. 06286-65232

HAWKER SIDDELEY
BROOK MOTORS LTD
require a
Systems Analyst

Our present IBM System handles the major Production Control and Commercial applications. We wish to develop systems to transfer these activities to a computer capable of Database and On Line applications.

An investigation into the use of Micro-Processors and Personal Computers is also being carried out.

Applicants should preferably have two years' experience in Systems Analysis on an IBM System 3, System 34, or equivalent. Experience of On Line systems would also be of advantage.

A competitive salary according to age and experience will be paid.

Forward written applications, giving career details to date and current salary, to:

Gordon Smith
Training & Recruitment Manager
EMPRESS WORKS, HUDDERSFIELD

DERBYSHIRE CONSTABULARY

Applications are invited for the following post, based at Force Headquarters, Ripley, Derbyshire. A job description is available.

SYSTEMS ANALYST

The salary will be in accordance with the N.J.C. scale P.O.D. (£6,410-£8,030 plus £312 supplement).

The successful applicant will be required to form part of an existing Computer Project team.

He/she should have experience in the design and programming of real-time systems using mini computer hardware and should have a good working knowledge of at least one assembler and one high level language and experience of testing and resolution of problems at systems level.

The successful applicant will be required, under the direction of the Project Manager(s) to assist in the evaluation, design and development of on-line, real-time computer systems for the Derbyshire Constabulary which will include command and control and information systems, from feasibility to implementation and thereafter continuing system development and maintenance, and liaison with the Local Authority in connection with the design and development of police applications on their I.B.M. mainframe.

A degree or equivalent professional qualification is desirable. Suitably qualified disabled persons will be considered.

Application forms may be obtained from the Chief Constable, Police Headquarters, Ripley, Derbyshire, and should be returned to Ripley 2 [illegible]

THE SALES AND MARKETING BIT

For those with bad memories....

LAST week we discussed the benefits of the in-call report and the many advantages related to producing a written record in parallel with the occurrence of events. That dissertation was really about the vagaries of the human memory and its great talent for forgetting, sometimes temporarily, sometimes permanently.

Some people confess to having a bad memory, some people claim to have a good memory, but nobody has a perfect one. Therefore, if one subscribes to the philosophy that even one disaster due to oversight is too many, then it is necessary to have some mechanism which will compensate for one's natural inability to remember absolutely everything.

Me? I have a good memory; the only problem is I sometimes remember when it's too late!

My own solution to this human failing is write down absolutely every action I have to take, in such a way that it cannot escape until the job is done. However, the primary danger in writing down actions to be taken is the possible complacent attitude that a job listed is a job half done. It can lull one into a false sense of security; it can take away the sense of urgency.

It is therefore essential that a reminder list is an effective working document.

In my experience the most important aspect of this kind of document is that every outstanding item is contained in a single page so that the total situation can be seen at a glance.

My personal system is to take an A4 or foolscap page and divide it vertically into two halves. Then on the left-hand side of both halves I draw four columns each of approximately one-tenth of an inch in width. The half page to the left I normally use for telephone calls and the one on the right for other actions.

Each note to be acted upon must be sufficiently brief to be contained in a single line of the half-page width (which means the writing is sometimes very small!). The four columns are merely quick reference checks in order to assess the overall nature of outstanding actions.

A tick in the first column means the item is urgent. The second refers only to outstanding telephone contact where each tick represents contact with a company but the individual was out or unavailable.

The third column again refers to telephone only where a tick indicates a promise by the person concerned to phone me back.

A tick in the fourth column tells me that I have passed this action to someone else for them to carry out. Sub-contracting an action/job to someone else does not necessarily mean the job will be done!

You may find this system a little complicated, but it works for me — and that is the ultimate test of an effective reminder system; it works with complete reliability for the individual concerned.

One golden rule for those considering the introduction of modification of a "prompt-sheet" in their business life: Be sure it is totally contained in a single page. A reminder system and a shorthand note-book is a contradiction in terms. An action overleaf is an action forgotten!

TRADER

BOOK REVIEW

In-depth knowledge

The board and computer management. By J. N. Galley. Published by Business Books in the Management for the Board Series. £8.95.

ANY data processing manager who reads this publication as a means of identifying possible promotion paths, will be disappointed. The book is designed to inform senior company management and directors — the board — on the basic facts on computing.

Any senior manager, however, who completes the course could well qualify for a job as DP manager. Few senior company managers and directors would require such in-depth knowledge as is imparted by this book. Senior management are advised on such topics as optimum cable length, floor loadings and database structures. Directors are recommended to organise the computer shop as far as possible to do without changes of disc packs and minimise tape mounts. It is one thing to make the board aware of the implications of computing, but advising hands-on experience seems far from practical.

It is evident that the author is more at home in the computer room than the board room. A single paragraph covers leasing or buying, an area which normally calls for a decision from the board. The often valid option of renting is totally ignored.

But the book is strong on such matters as security and back-up, though strangely omitted is any mention of off-site security warehouses for storing archives and data files. However the board will no doubt take note of the suggestion that "disasters of the magnitude which wipe out a significant number of your staff, will take a long time to recover from". The National Computing Centre security team and the Institute of Data Processing Management would no doubt like to have more details.

A.S.

Puzzle Answer

54
3×

162

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Senior Operator 2903/4	£5000	Surrey Ref. 2944
Operator PDP Dec	c£4900	Surrey Ref. 2944
Operations Supervisor 2900/Gis	c£5000	Central London Ref. 2944
Operator 1900/GII+	£4500	West London Ref. 2944
Senior Operator Exec 8	c£4800	Bucks Ref. 2944
Senior Operator System 3. Days only	c£4100	Croydon Ref. 2944
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CW/22/3/79

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We could go on listing (ad infinitum) the reasons to complete and return our coupon.

The best idea you could have is to return the completed coupon as soon as possible.

01-439 6481 (24-HOUR ANSWERING SERVICE)
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LONDON W1V 3HP
COMPUTER PERSONNEL CONSULTANTS
LICENCE No. 88(A) 62

Ascii through the Logic Gate

An epic in 32K words, by Richard Forsyth

Block 31 (Blockbuster)

Hex has arrived with Johnny McNull at the site of the Future System, deep underground. There he encounters Cleo once more as well as Pilldown's clone, Neddy the Neanderthal. Mike Rose announces to them the staggering breakthrough which has made all prior dataprocessing systems unviable at a stroke – the programmable virus.

HE invited Hex to step up and view a sample through the microscope. Hex peered down. All he saw was a blurred mass of squirming caterpillar-like shapes.

"It looks rather indistinct to me!" he admitted.

"But you understand the momentous implications, do you not? Injected into a suitable host, those organisms could turn any living creature into any other creature, anything you care to imagine. Take Neddy as comparison: he's an elementary piece of recombinant DNA engineering; but even he cost me many nights' arduous toil breaking up chromosomes and piecing them together again. I had to throw away over 90% of my attempts. I don't mind. It's my hobby. But consider the possibilities with programmable genes. I could sit down at a terminal, type out a specification, compile it into RNA, and populate the globe with Neddies – or unicorns if you prefer."

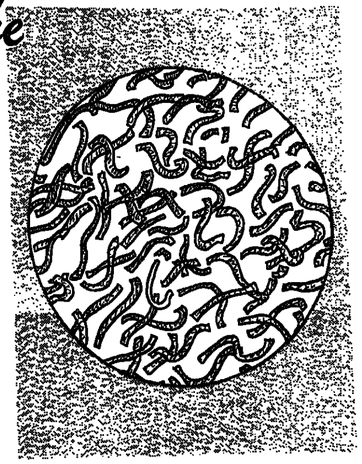
"I think I prefer Neddies," said Cleo under her breath.

"Naturally the greatest benefit," Rose continued, "is that it permits the creation of totally new life forms whose primary purpose is to act as computing elements in a vast new super-system. The whole world can be transformed into one gigantic throbbing DP department, perpetually growing and renewing itself. And the beauty of it is; it's purely biological, so it's immune to gigsis."

"Who would be the users?" Hex ventured to ask.

"No users!" he snapped. "We can't have users meddling with a project of this magnitude – changing this and that, clamouring for extra facilities, haggling over completion dates. That's what gives the scheme its tremendous potential – infinite computing power unfettered by the petty demands of ignorant users. A liberation of the spirit! Users will disappear from the picture for good: nothing will exist except a worldwide relational database in a state of uninterrupted computational ecstasy." His eyes misted at the inspiring vision.

While Rose was waxing lyrical on the shape of things to come, McNull sloped off into a corner to practise meditation. He was very into Transcendental Numbers (TN). He found that a short period spent contemplating the mystery of irrational numbers was the only way to free his brain from its peculiar disability. He just let his mind go blank and concentrated on the mantra "PI". After 20 minutes he would wake relaxed and refreshed.



"Just one more question," enquired Hex, "how do you program a programmable virus?"

"That's where you fit in," Rose replied, and handed him a slim silver gadget like an old-fashioned pocket calculator.

Hex turned it over in his hands. It had a two-digit display and four keys, labelled A, G, C and T. Dangling from it was a helical length of double wire that led into a glass bottle sealed with a heavy rubber stopper.

"It's an enzyme interface," explained Rose. "Each keystroke releases a particular structure-building catalytic agent which causes formation of DNA and thus genes. You have to learn to program in a code which consists of sequences of the four bases Adenine, Guanine, Cytosine and Thymine. It works on the quaternary system. Your job is to toggle in a bootstrap loader; ie to create an organism capable of reading binary data. Then we can use that to transfer the information in the databanks downstairs. You see, BOSS already exists, down there in the cave attended by all those robots – but in electrological hardware and hence still susceptible to gigsis. Once it has been incorporated into organic matter it takes on a life of its own."

He went to a cupboard and brought back a stack of manuals. Hex eyed them with trepidation. There were 10 or a dozen.

"Why me?" asked Hex. "Surely any competent programmer could do it?"

"You're the best programmer in the System," replied Rose. "Besides, you're the BOSS's son."

"What's that supposed to mean?"

"It's obvious to anyone who thinks about such things that the Hexadecimal Kid could never have got away with all his capers without some conniving at the highest level. It also well known in some circles that Igor Gigotski and Abraham Synapse were one and the same person. Synapse created the System and in so doing found he had embodied an improved version of himself in electrical circuitry – a megnatic personality, so to speak. As it went from strength to strength, his pride rebelled. He tried to fight it and took on various aliases, first Igor Gigotski while he was working on the algebraic fundamentals of gigosis, then Dr Null – a symptom of the disintegration of his identity. Now you see why the System has a soft spot for you."

"But I'm Sam Zilch."

"Not really. Zilch was your mother's maiden name. You're Sam Synapse, always have been. The DPM only revealed a little at a time, to test your mettle."

"How do you know all this?"

"We've been expecting you. You couldn't have got this far otherwise."

Hex digested this slowly. "Then it's all a question of whether I follow Abraham Synapse alias Dr Null or Abraham Synapse the DPM?" As befits an android he had divided loyalties.

"Yes. A critical stage in the process is in your hands. Mind you, I'm instructed to kill you on the spot if you decide to put a spanner in the works."

"Don't do it, Sam!" Cleo cried out. "Information is power, and power corrupts."

"Shut up!" snarled Rose. "If you can't be useful, be quiet."

"All right," said Hex almost casually. "Let's get on with it."

Cleo looked despondent.

Hex settled down to flick through the pile of manuals. Genetic programming wasn't easy. He could see why Rose, even though he'd invented the concept and written the handbooks, had baulked at the details. Even a small absolute loader was no trivial task. Soon he was immersed in a new realm, requiring a complete re-orientation of his program methodology. It was extremely interesting.

Will Hex double-cross the double helix? All will be revealed.

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